

HORTICULTURAL ABSTRACTS

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MISCELLANEOUS.

General.

2407. HUDSON, C. E.

The N.A.A.S. Experimental Horticulture Stations, Progress Report No. 1, 1952, pp. 9.

A concise outline of the stations in question and of the arrangements for work and dissemination of results.

2408. FAIRFIELD.

Station Guide Fairfield Experimental Horticulture Station, 1953, Esprick, Kirkham, Preston, Lancs., pp. 12.

The main work of the station concerns glasshouse cropping with subsidiary interests in soft fruit, intensive vegetable and hardy flower production. It serves the North Midlands and North of England for glasshouse crops, North-West England for soft fruit production and North-West England including the North-West Midlands for hardy flowers. A note on buildings is followed by a skeleton outline of experiments in being or shortly to be initiated. Among them are trials on: design of glasshouses, their heating and ventilation and working technique, tomato variety trials including hybrid vigour varieties, methods of watering, soft fruit varieties, dahlia varieties, early flowering chrysanthemums, scabious propagation, wind effects, nutrition.

2409. STOCKBRIDGE.

Station Guide Stockbridge House Experimental Horticulture Station, 1953, Cawood, Selby, Yorks., pp. 21.

An account of the experimental buildings, viz. east-west propagating houses, Dutch light structure, mobile structure and Dutch light frames, is followed by an outline of long- and short-term experiments laid down in 1951 and later. They concern: cultivation methods, trials on residual fertilizers, rhubarb manuring, varieties of apples, plums and small fruits, varieties of brussels sprouts and of early cauliflowers, various aspects of brassica cultivation including the problem of whiptail, shelter screens, rhubarb varieties and cultivation.

2410. BENNETT, L. G.

The horticultural industry of Middlesex. Misc. Stud. Dep. agric. Econ., Univ. Reading 7, 1952, pp. 70, bibl. numerous, illus., 70.

The first part of this survey deals with the development of the horticultural industry in Middlesex and the London region, showing how it was established, how it expanded and how it later declined in importance, and analysing the factors that have been responsible for this decline. The second part deals with the present structure of the industry—its geographical distribution, size and forms of management. It is concluded that the

only solution to the growing claims of urban expansion lies in the intensification of methods of production.

2411. RICHARDSON, P. P.

Market gardening in the Melbourne area of Derbyshire.

[*Publ.*] *Dep. agric. Econ., Univ. Nottingham F.R.117*, 1952, pp. 63, bibl. 14, map.

This survey, which is largely of a descriptive character, is intended as a basis for a critical study of the economic problems of horticultural production. The aspects dealt with include size of holding and land utilization, sources of revenue, main items of expenditure, labour, tenants' capital, land tenure, and marketing.

2412. DE WIT, W.

De tuinbouw in Nederland. (Horticulture in the Netherlands.)

Meded. TuinbVoorlicht. Dienst 50, 1952, pp. 64, illus., F. 1.75.

FOREIGN AGRICULTURAL INFORMATION DEPARTMENT.

Horticulture in the Netherlands. Facts and figures.

[*Publ.*] *Minist. Agric. Netherlands*, 1952, pp. 64, illus.

These surveys, of which the second is a slightly modified translation of the first for the benefit of foreign visitors, give a good general picture of the Dutch horticultural industry. Useful information is afforded on such subjects as soils and climate, the relative importance of the various branches of horticulture, marketing arrangements, horticultural organizations, advisory and educational services, research centres and control regulations.

2413. FRIESDORF.

Betriebswirtschaftliche Ermittlungen. (Market garden statistics [in Germany].)

TätigkBer. gärtn. Versuchsanst. Friesdorf/ Bad Godesberg, 1951, 23: 3-10.

This survey of the economics of market gardens in several West-German Länder includes statistical data under the following heads: Ratio of unproductive area to total area; area under glass; ratio of area under glass to volume under glass; heat losses in glasshouses; heating capacity in relation to actual heat used; ratio of sun energy (in cal./m²) in the field to that in the glasshouse; labour studies.

2414. SEEMANN, J.

Arbeiten über eine Oekologie der Gewächshäuser. (Glasshouse ecology.)

TätigkBer. gärtn. Versuchsanst. Friesdorf/ Bad Godesberg, 1951, 23: 10-17.

Data are given on: radiation measurements in glasshouses; temperature and light measurements in frames under different types of lights; the soiling of glasshouse glass; and temperature curves in glasshouses.

Statistical design.

(See also 2566, 3318, 3645.)

2415. PEARCE, S. C., JOLLY, G. M., AND FREEMAN, G. H.

A review of experimental design at East Malling, 1948-1952.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 83-7, bibl. 6, illus.

Since the last review was published [see *H.A.*, 18: 2395] field experimentation with tree and bush fruits has largely followed the recommendations given there. Subsequent developments are discussed briefly in the present paper with particular reference to designs for calibration trials, the elimination of external guard rows, the changing of treatments in a long-term trial, certain other uses of balanced designs, and restricted randomization. Examples of the various designs used are illustrated. [See also abstract 3645.]

2416. KUIPER, N. H.

On 4² factorial designs with confounding.

Neth. J. agric. Sci., 1953, 1: 11-14, bibl. 4.

A design is given for three factors each at four levels in three blocks of 8×8 plots. In each block in the field fertility in the direction of columns and of rows is not neglected. The main effects are not confounded. The interactions are partially confounded. The part is $\leq 1/3$ for any component of the interaction. Formulae for the estimation of main effects and (all) interactions and for the analysis of variance are given in vector notation. [Author's summary.]

2417. MOORE, P. G.

A test for non-randomness in plant populations.

Ann. Bot. Lond., 1953, 17: 57-62, bibl. 6.

The criterion used is $\mathcal{O} = \frac{2n_0 n_2}{n_i^2}$, where n_i is the number of quadrats containing i shoots of the species under study.

Biochemistry.

(See also 2516a.)

2418. MASON, A. C.

The cleaning of leaves prior to analysis.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 104-7, bibl. 8.

Fine atmospheric dust, which contains a considerable proportion of iron, may settle on exposed plant material and cause serious errors in analytical results. Wiping with dry or damp muslin did not remove all surface contamination and gentle scrubbing in detergent solution or dilute acid is recommended. For elements other than iron (N, P, K, Ca, Mg, Mn) the differences between figures for cleaned and uncleansed leaves were insignificant. Leaching of nutrients from living leaves was negligible for immersion periods of a minute or less but became more serious as the immersion time was increased. [Author's summary.]

2419. PHILIPSON, T.

Boron in plant and soil with special regard to Swedish agriculture.

Acta Agric. Scand., 1953, 3: 121-242, bibl. pp. 2½.

This paper includes a description of a method of B determination in micro-quantities with the aid of curcumin as analytical reagent, and a discussion of B availability.

2420. HUNTER, J. G., AND HALL, A.

The determination of calcium in plants and soils.

Analyst, 1953, 78: 106-10, bibl. 10.

A description is given of a new turbidimetric method

for the determination of Ca in plants and soils which, it is claimed, is much more accurate than previously published turbidimetric methods and determines from 0.05 to 0.50 mg. Ca within $\pm 5\%$ accuracy. It is based on the turbidity formed on adding a precipitating reagent to a Na acetate-acetic acid buffer solution containing the Ca.—Macaulay Institute for Soil Research, Aberdeen.

2421. FORSTER, W. A.

The determination of magnesium in plant material by means of ethylenediamine-tetra-acetic acid.

Analyst, 1953, 78: 179-80, bibl. 2.

The usual methods are not applicable to the determination of the very small quantities of Mg commonly found in the acid digests of the roots of plants grown in pot cultures designed to study the effects of adding Cu. A more satisfactory method is described in which Mg is determined by titration with EDTA after prior separation of interfering metals.—Long Ashton Res. Stat.

2422. ARENS, K.

Prova de calose por meio da microscopia a luz fluorescente e aplicações do método. (Identification of callose by means of the fluorescence microscope, and application of the method.) [English abstract 9 lines.]

Lilloa, 1949, 18: 71-5, bibl. 10.

The presence of the carbohydrate callose can be readily shown by triaminotriphenylmethane dyes with the aid of a fluorescence microscope. The method is described and its application is discussed for observation of (1) mycelia of parasitic Oomycetae within intact tissue, (2) pollen tubes within intact stigmas or styles, and (3) the callose in the sieve plates, cystoliths, etc.

2423. ALBAUM, H. G.

The metabolism of phosphorylated compounds in plants.

Annu. Rev. Plant Physiol., 1952, 3: 35-58, bibl. 100.

A critical examination of the procedures for identifying and estimating phosphorylated compounds in plants is followed by a discussion of the way in which these compounds participate in certain vital plant activities.

2424. BRYANT, F., AND OVERELL, B. T.

Quantitative chromatographic analysis of organic acids in plant tissue extracts. [French and German summaries 5 lines each.]

Biochim. Biophys. Acta, 1953, 10: 471-6, bibl. 12.

A method of estimation of certain organic carboxylic acids has been developed by utilizing a paper chromatography technique relating concentration to the weight of paper occupied by the spot. The method has been used in the analysis of apple and carrot tissues, the extracts of which have been freed from sugars and pigments by passage through exchange resin columns. [Authors' summary.]

2425. POVOLOCKAJA, K. L., AND SKOROBOGATOVA, E. P.

Comparison of chemical and microbiological methods of riboflavin determination in plant material. [Russian.]

Biohimija, 1953, 18: 79-88, bibl. 15.

Figures are presented showing a reasonably good

agreement between the two methods used for riboflavin determination in a number of vegetables, citrus and wild rose. For large-scale estimation chemical analysis is recommended, though it is considered necessary to check the results by the microbiological method.

Physiology.

(See also 2516b, c, 3631, 3632, 3674.)

2426. HUBER, B.

Tree physiology.

Annu. Rev. Plant Physiol., 1952, 3: 333-46, bibl. 98.

The size and longevity of trees produce special physiological problems and make special methods of research necessary. These are illustrated in a review of some literature on the physiology of nutrition, growth and reproduction of forest trees. The principles involved will doubtless be of interest also to those working on horticultural tree crops.

2427. RABINOWITCH, E.

Photosynthesis.

Annu. Rev. Plant Physiol., 1952, 3: 229-64, bibl. 140.

Progress in the following fields is reviewed: (1) structure and composition of the photosynthetic apparatus, (2) function of different pigments, and (3) photo-chemistry of chloroplast preparations and chlorophyll solutions.

2428. BRIGANTI, G. M.

Periodo di adattamento alla luce relativo al processo fotosintetico. (Period of adaptation to light in photosynthesis.)

Ann. Fac. Agrar. Perugia, 1950, 7: 129-33, bibl. 5 [received 1953].

It was observed in the course of experiments that, when plants are first exposed to light, photosynthesis proceeds at a slower rate than later, though light and temperature remain the same. The behaviour of *Nicotiana rustica* (among other plants) was studied in this respect. The amount of carbon dioxide absorbed was 0.206 and 0.437 g. per 100 g. dry matter in the first hour, 0.426 to 0.878 in the second, 1.282 to 1.852 in the third and 1.261 to 2.022 in the fourth. There are two possible explanations of this: (1) that as a result of the partial closing of the stomata during the night the carbon dioxide of night respiration remains largely within the plant dissolved in the imbibition water of the cellular membranes; (2) that chlorophyll undergoes a partial change at night. To discover which of these is the explanation of the phenomenon an experiment was conducted with the water plant, *Elodea crispa*, to determine, not the carbon dioxide absorbed, but the oxygen produced. The oxygen produced in the first half-hour of exposure by plants previously kept in the dark was about half that produced in the second half-hour, while that produced in the first and subsequent half-hours by plants not previously kept in the dark was little different in amount, a result which supports the second hypothesis.—Instituto Botanico dell' Università degli studi di Perugia.

2429. WAREING, P. F.

A new photoperiodic phenomenon in short-day plants.

Nature, 1953, 171: 614-15, bibl. 4.

Experiments with the short-day plants Biloxi soya bean and *Perilla ocyoides* showed that the length of the limiting light period varies with the duration of the dark period. When the latter is abnormally long, the length of the associated light periods must be reduced if flowering is to occur. The results are tabulated and illustrated graphically.—Manchester University.

2430. WELLENSIEK, S. J.

Photoperiodism and temperature in *Perilla*.
Reprinted from *Proc. kon. ned. Akad. Wetensch. Ser. C*, 1952, **55**: 701-7, bibl. 9, as *Publ. Lab. TuinbPlantent.*, Wageningen, **110**.

Perilla is a qualitative short-day plant which has visible flower buds after about 20 cycles of 8 hours light and 16 hours darkness under optimal conditions. At low temperature of 5° C. a complete inhibition of the photoperiodic action occurs. Low temperature, differentially applied only in the dark phase, completely inhibits flower initiation. Low temperature, differentially applied only in the light phase, does not prevent flower initiation, but delays it, while elongation of the buds is completely inhibited. It is concluded that the crucial photoperiodic action takes place during the dark phase. For rapid initiation and for complete flowering, however, an active light phase is also necessary, the effect of which is ascribed to photosynthesis. [From author's summary.]

2431. RODRIGO, F. A.

Preliminary note on experiments concerning the state of chlorophyll in the plant.

Biochim. biophys. Acta, 1953, **10**: 342, bibl. 4.

The fluorescence, the location of the absorption maxima and the photochemical activity of chlorophyll in the plant were investigated by studying its fluorescent capacity in a monolayer, by examining the factors influencing the location of the red absorption band and by determining the properties of "synthetic" chlorophyll-complexes. It was concluded that the fluorescence of green cells cannot be ascribed to the possible occurrence of chlorophyll in monolayers, and that it is highly probable that the location of the red absorption band of chlorophyll adsorbent complexes depends on the nature of the adsorbent.

2432. GORIS, A.

Influence de l'éclairement sur la teneur en fructose de diverses souches de tissus de carotte et de crown-gall de vigne cultivées *in vitro*. (The effect of light on the fructose content of various types of tissue of carrot and vine crown-gall grown *in vitro*.)

Bull. Soc. Chim. biol., 1951, **34**: 527-31, from abstr. in *Bol. Inst. Invest. agron.*

Madrid, 1952, **12**: 658.

The percentage of fructose in carrot tissue grown on glucose medium decreased during darkness. It appears that a photochemical reaction brings about the transformation of glucose into fructose. Experiments on the crown-gall tissue of vine, containing no chlorophyll, showed that this photochemical reaction is dependent on chlorophyll.

2433. STRAUS, W.

Chromoplasts—development of crystalline forms, structure, state of the pigments.

Bot. Rev., 1953, **19**: 147-86, bibl. 136.

This review on the development and shape of chromoplasts and the relationship between them and cytoplasm includes observations made by the author on carrot chromoplasts.

2434. TOMBESI, L., AND OTHERS.

Intensità fotosintetica e respiratoria, attività ossidasiche, catalasica, carboanidrasica, perossidasiche e contenuto in glutathione ridotto ed acido ascorbico durante alcune fasi del ciclo vegetativo della pianta. (Photosynthetic and respiratory intensity, oxidase, catalase, carboanhydrase and peroxidase activity, and reduced glutathione and ascorbic acid content during certain stages of plant growth.) [English summary ½ p.]

Ann. Sper. agrar., 1953, **7**: 5-15, bibl. 8.

The rates of oxidase, catalase, carboanhydrase and peroxidase activity and of photosynthesis and respiration, and the variations in reduced glutathione, ascorbic acid and amide N content were studied in the leaves of the turnip during growth, flowering and fruiting. Relationships between respiration and photosynthesis and between photosynthesis and carboanhydrase activity were observed. There was a period of reduced photosynthesis and respiration before fruit set. The increase in the concentration of amide N at this stage was related to the transport of material towards the flowers and to respiratory activity. In the case of var. *oleifera* there was an increase in peroxidase activity and a diminution in ascorbic acid during growth.—Staz. chim. agrar. Roma.

2435. BEEVERS, H.

2,4-dinitrophenol and plant respiration.

Amer. J. Bot., 1953, **40**: 91-6, bibl. 16.

Respiratory stimulations were induced by low concentrations of DNP (ca. 10^{-5} M at pH 5.0) in a variety of tissues; the greatest stimulation was observed in a storage organ, carrot, while the lowest was that in meristematic and juvenile tissues of corn root tips. Alcohol and acetaldehyde were shown to be the end products in the aerobic fermentation which in carrot and corn accompanied respiration at concentrations of DNP greater than 10^{-6} M, and the induction of fermentation was also inferred from the high RQ values obtained with the other materials. There were differences in the extent to which fermentation occurred in the various tissues, at the concentration of DNP inducing maximum O_2 uptake. Calculations of CHO loss in the presence of DNP show that this may be over three times the rate of the control in air, and also may considerably exceed that in nitrogen. The relationships between respiration and fermentation and DNP respiration have been examined and the conclusion is reached that, in non-inhibitory concentrations, the major effect of DNP is to induce an increase in the rate of glycolysis. Certain implications relating to the Pasteur effect are discussed. [Author's summary.]—Purdue Univ., Lafayette, Ind.

2436. DE VRIES, D. A., AND VAN DUIN, R. H. A.

Some considerations on the diurnal variation of transpiration.

Neth. J. agric. Sci., 1953, **1**: 27-34, bibl. 9.

The diurnal variation of the measured transpiration from pots with alfalfa plants and the readings of several

evaporimeters for a case reported by Briggs and Shantz are compared with the calculated values according to Penman's theory. The influence of radiation on transpiration and evaporation is clearly illustrated. The ratio between transpiration and calculated evaporation is almost constant and shows less variation than the transpiration/evaporimeter-reading ratios. The differences in magnitude between the transpiration and the evaporation values and the limitations of the theoretical treatment are discussed. It is pointed out that the evaporation from isolated plants or groups of plants which project above their surroundings will usually be greater than the evaporation from a closed homogeneous vegetation with the same height as these plants.

2437. VAN WIJK, W. R., DE VRIES, D. A., AND VAN DUIN, R. H. A.

Potential evapotranspiration.

Neth. J. agric. Sci., 1953, 1: 35-9, bibl. 8.

Potential evapotranspiration calculated with Thornthwaite's empirical formula for several stations is compared with the values following from Penman's theory. Yearly values show a reasonable agreement. Monthly values, however, show a shift in phase, due to the fact that Penman's values are nearly in phase with solar radiation, whereas those according to Thornthwaite are in phase with temperature. If advective heat transfer is not important, the former view is favoured by theory. [Authors' summary.]

2438. HYGEN, G.

Studies in plant transpiration. II.

Physiol. Plant., 1953, 6: 106-33, bibl. 9, being *Rep. bot. Inst. agric. Coll. Vollebekk, Norway*, 3.

An earlier paper (H.A., 21: 2232) described a torsion balance method of measuring transpiration in excised leaves and shoots of blueberry and reported the results obtained. The second paper presents the data of further measurements on two more *Vaccinium* spp. and on many other plants collected from different localities. The significance of the curves calculated from the transpiration values is discussed.

2439. RAWITSCHER, F., AND MORELLO, J.

Eficacia del método de pesadas rápidas para medir la transpiración de plantas, I and II. (The efficiency of the method of rapid weighing for the measurement of transpiration in plants. I and II.)

Cien. y Invest., 1952, 8: 183-5, 275-85, bibl. 26, illus.

Experiments were conducted in the Botany Department of the Faculty of Philosophy, Sciences and Letters, São Paulo, to determine whether the rapid weighing of cut portions of plants by torsion balance provides an accurate measurement of transpiration. The aim was to ascertain whether the rate of transpiration after cutting is the same as that beforehand and whether the cut causes any alteration in the rate of loss of water. Among plants employed were *Coffea arabica*, *Nicotiana tabacum*, *Lycopersicum esculentum*, *Phaseolus vulgaris*, *Datura fastuosa* and *Delphinium ajacis*. In experiments with cut portions of plants the cutting had no effect on rate of transpiration or water content. In experiments with whole seedlings cut off 2 cm. above the collar

during the experiment the rate of transpiration remained unaltered after cutting for a variable period depending on the speed with which the plant lost water and on its physiological characters. As there was no significant change in transpiration rate in any of the experiments, it was concluded that the torsion balance can be used with every confidence in the study of transpiration.

2440. MORELLO, J.

Cuánta agua transpiran las plantas? (The amount of water transpired by plants.)

Cien. y. Invest., 1953, 9: 51-60, bibl. 24.

The problems involved in the quantitative determination of transpiration and the methods used are reviewed. Some figures obtained from the literature are given for the transpiration of various crop plants, including coffee, banana, hevea, eucalyptus and *Acacia mollissima*.

2441. KONIS, E.

The effect of leaf temperature on transpiration.

Ecology, 1950, 31: 147-8, bibl. 7 [received 1953].

Experiments were carried out to ascertain the dependence of transpiration upon the temperature gradient between air and leaf. Varying temperatures were induced by varying the position of adjacent leaves between the horizontal and vertical. Seven species of maquis plants were used. It is shown that temperature increments of the leaves on a clear sunny day are capable of increasing transpiration by as much as 30% to 230%. A high degree of correlation exists between the increase in transpiration and the temperature increment. The significance of these findings for the study and measurement of transpiration is pointed out. —Hebrew Univ., Jerusalem.

2442. KLEŠNIN, A. F.

The temperature of leaves when artificially illuminated. [Russian.]

Doklady Akad. Nauk S.S.R., 1951, 79: 1029-32, bibl. 6.

Experiments were carried out on *Phyllocactus hybrida*, *Amaryllis hybrida*, *Cucumis sativa* and *Pelargonium zonale* as representing four different types of plant, using different sources and colours of artificial radiation. From data tabulated and from graphs shown it is concluded that during artificial illumination leaves have a significantly higher temperature than the surrounding air. The temperature gradient is higher, the higher the summation of the intensity of radiation, and is related to the absorption of the radiant energy by the chlorophyll and the carotenoids, and the moisture content of the leaves (with regard to infra-red radiation). The water regime of plants serves as a regulator of temperature. Temperature depends, on the one hand, on the intensity of transpiration, and, on the other, on the amount of water per unit surface of the leaf.

2443. WILSON, C. C., BOGESS, W. R., AND KRAMER, P. J.

Diurnal fluctuations in the moisture content of some herbaceous plants.

Amer. J. Bot., 1953, 40: 97-100, bibl. 19.

A study was made of the diurnal fluctuations in the moisture content of the roots, stems, and leaves of sunflower and amaranthus plants. The moisture content of the leaves reached a minimum during the afternoon

and attained a maximum between 12 and 4 a.m. The appearance of the maxima between midnight and 4 a.m. is possibly a result of changes in dry weight upon which the moisture content was based, rather than a change in the absolute amount of water in the tissues. The moisture content of the roots and stems reached a maximum between 6 and 10 a.m. and during the remainder of the day paralleled fairly closely the water content of the leaves. Root pressure possibly is a significant factor in supplying the roots and stems with water during the early morning, but is considered to be a negligible factor when tensions are developed in the plant. [Authors' summary.]

2444. WASSINK, E. C., STOLWIJK, J. A. J., AND BEEMSTER, A. B. R.

Dependence of formative and photoperiodic reactions in *Brassica rapa* var., *Cosmos* and *Lactuca* on wavelength and time of irradiation.

Proc. kon. ned. Akad. Wetensch. Ser. C, 1951, **54**: 421-32, bibl. 11, illus., being *Commun. Lab. plant physiol. Res., Wageningen* **92** [received 1953].

Brassica rapa oleifera subf. *annua*, a long-day plant, was given supplementary irradiation with various wavelength regions for 4 hours subsequent to a short day of 8 hrs in strong artificial white light. The controls in white light remained vegetative. Flowering and stem elongation was induced by irradiation with violet, blue and infra-red light. These effects of wavelength regions were the same as those obtained in a previous experiment with a long photoperiod. With *Cosmos bipinnatus*, a short-day plant, the red, yellow and green parts of the spectrum were most effective in suppressing flowering when given for 8 hrs supplementary to a 10-hour short day in white light. Violet, blue and infra-red irradiation caused an elongation of the internodes which appeared to be independent of flowering. With *Lactuca sativa* var. *Meikoningin*, a long-day plant, 8 hrs exposure to coloured light subsequent to 10 hrs exposure to white light in no case resulted in flowering. Considerable elongation, however, occurred with blue, violet and infra-red additional illumination.

2445. WASSINK, E. C., AND STOLWIJK, J. A. J.

Effects of light of narrow spectral regions on growth and development of plants. I.

Proc. kon. ned. Akad. Wetensch. Ser. C, 1952, **55**: 471-88, bibl. 11, illus.

Equipment is described for growing plants under high light intensities in several spectral regions without the use of white light. Fluorescent tubes with a limited spectral emission have been combined with large glass filters to give coloured light of high intensity and very satisfactory spectral purity. *Cosmos bipinnatus*, *Solanum lycopersicum* and *Iberis coronaria* grown under a 16-hour photoperiod in monochromatic light all showed marked elongation of the stem and curling of the leaves and petioles in the green, yellow and red regions, whereas plants in blue light were shorter than the controls in white light and had a normal appearance. *Cosmos* plants receiving 10 hours of white light and 8 hours of high intensity supplementary light of various wavelength regions failed to show any appreciable effects of the supplementary irradiation. *Iberis* and

Solanum plants, receiving 10 hours of white light and 8 hours of low intensity supplementary light of various spectral regions, reacted with stem elongation to blue and infra-red light, whereas plants in red, green and yellow light were very much like the controls in white light. This behaviour is the opposite to that of plants grown only in light of high intensity in the various spectral regions, excluding white light.

2446. STOLWIJK, J. A. J.

Photoperiodic and formative effects of various wavelength regions in *Cosmos bipinnatus*, *Spinacia oleracea*, *Sinapis alba* and *Pisum sativum*. I.

Proc. kon. ned. Akad. Wetensch. Ser. C, 1952, **55**: 489-502, bibl. 9, illus., being *Commun. Lab. plant physiol. Res. Wageningen* **104**.

Spinacia oleracea var. *Nobel* showed a strong photoperiodic response to the green, yellow and red regions of the spectrum, whereas violet, blue and infra-red had a much smaller photoperiodic effect but caused elongation of the petioles. *Cosmos* plants were given additional irradiation of 2 hrs duration at various times during a 14-hour dark period. Blue and infra-red irradiation caused internode elongation and this reaction appeared to be independent of the time at which it was given. Supplementary light given near the middle of the dark period was more effective in producing a photoperiodic reaction than light given near the beginning or end of the dark period. *Sinapis alba* showed photoperiodic and formative reactions to blue and infra-red supplementary irradiation very similar to those shown previously by *Brassica rapa* [see abstract above]. With *Pisum sativum* additional irradiation with violet, blue or infra-red light, subsequent to a period under strong white light, caused elongation of internodes. Elongation did not occur, however, when the plants were grown under coloured light alone. Leaf growth was greatest under yellow and red light. Leaves given infra-red light were intensely yellow. The antagonistic effects of blue, violet and infra-red radiation on the one hand and yellow, green and red radiation on the other were demonstrated by *Spinacia* and *Cosmos*.

2447. WITTHROW, R. B., AND OTHERS.

Influence of visible and near infrared radiant energy on organ development and pigment synthesis in bean and corn.

Plant Physiol., 1953, **28**: 1-14, bibl. 19, illus.

Results are presented on the effects of 5 spectral regions, applied continuously, on seedling growth and pigment synthesis in bean and corn. Maximum photomorphogenesis occurred with wavelengths of 630 to 700 m μ . Irradiances at 725 m μ of 150 to 450 μ w./cm. 2 are capable of inducing a strong photomorphogenic response with synthesis of only traces of chlorophyll. However, no combination of far red energy was found in this series of studies which induced a strong photomorphogenic response with no detectable chlorophyll. At 765 m μ , a weak photomorphogenic response was obtained with no measurable formation of chlorophyll. Blue irradiance of 2 μ w./cm. 2 induced weak photomorphogenesis with a chlorophyll concentration about 1,000-fold greater than that in plants under wavelengths

of 725 m μ with an equal degree of development. From these data it is concluded that there is no quantitative relationship between chlorophyll synthesis and the photomorphogenic responses. Data are presented on the effect of 725 m μ irradiances at 0, 150, 450, and 1,500 μ w./cm.² on dry weight distribution, stem lengths, and anthocyanin content in the bean plant, and fresh leaf weight, chlorophyll, protochlorophyll, and carotene in bean and corn. In both species, fresh leaf weight increased with increase in irradiance. Protochlorophyll and carotene synthesis were increased by low irradiances over the synthesis in the dark, but decreased with further increasing irradiances. All irradiation treatments used caused large increases in anthocyanin in bean hypocotyl. At 725 m μ the anthocyanin progressively increased with increase in irradiance. The synthesis of anthocyanin in bean and corn is dependent upon a photo-process which does not involve photosynthesis, as shown by marked formation of anthocyanin in the far red where photosynthesis did not occur. [From authors' summary.]—Smithsonian Inst., Wash., D.C.

2448. LANG, A.

Physiology of flowering.

Annu. Rev. Plant Physiol., 1952, 3: 265-306, bibl. 238.

This review of the literature covers work on floral initiation, photoperiodism, vernalization and its interrelation with photoperiodism, self-perpetuating effects in floral initiation, and the later stages of flowering.

2449. DE ZEEUW, D.

Literatuurstudie over toepassing van kunstlicht in de tuinbouw. (A review of the literature on the use of artificial illumination in horticulture.) [English summary 10 lines.] *Meded. LandbHoogesch. Wageningen*, 1952, 52: 129-65, bibl. 372.

The historical development and practical application of artificial illumination in horticulture are reviewed. Special attention is paid to the choice of lamp for (1) increasing photosynthesis, (2) affecting photoperiod, (3) forcing and (4) other purposes including storage of seed potatoes, germination of seeds and rooting of cuttings. The uses to which artificial illumination has been put, as recorded in the literature, are summarized in a table showing the crop, date of publication, treatment, light source, distance of lamp from soil, light intensity, duration of daily illumination, season of illumination, time of day at which illumination is given, purpose and reference number in the bibliography.

2450. BURGOS, J. J.

El termoderoidismo como factor bioclimático en el desarrollo de los vegetales. (Thermoperiodism as a bioclimatic factor in plant development.) [English summary 8 lines.] *Meteoros*, 1952, 2: 215-42, bibl. 104.

A concept of thermoperiodicity is propounded, based on a critical review of the literature. A bioclimatic classification of plants according to their annual thermoperiodicity is made.

2451. KONOVALOV, I. N.

Adaptation of growth rhythm in mulberry and catalpa during acclimatization. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1953, 88: 157-60, bibl. 11, illus.

Young (5-6-year-old) and mature (16-25-year-old) white mulberry, *Morus alba*, and catalpa, *Catalpa ovata*, seedling trees of southern origin were under observation in the Leningrad province. The growth rhythm of the young trees was similar to that of the original forms in the south, but in the older trees certain changes, such as earlier cessation of growth, lignification and storing of nutrients, were noted. The rate of biological processes resembled that of the northern woody species (linden, birch, etc.), clearly indicating that such characters can be adapted to the environment.

2452. PORPÁCZY, A.

Forschungsarbeiten über die Akklimatisierung in Ungarn. Theorie und Ergebnisse. (Theory and results of research on acclimatization in Hungary.) [English and Russian summaries ½ p. each.]

Acta Agron. Hung., 1952, 2: 81-97.

The author recapitulates current theory regarding acclimatization of cultivated plants in new areas, and outlines the methods whereby it can be satisfactorily obtained. It is stated that rice, castor beans, soya and sorghum have already been acclimatized in Hungary and that success in the case of kenaf, cotton, ramie, ground-nut, sweet potatoes and kok saghyz is envisaged.

2453. VASILJEVA, N. G.

The influence of high temperatures on the colloidal-chemical properties of plant protoplasm. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1953, 88: 341-4, bibl. 4.

One of the first signs of heat injury in the protoplasm appears to be an increase in its permeability. The action of high temperature in this respect is analogous to the action of desiccation. Peas, Russian beans and cabbages were found to be more sensitive to increases in temperature than marrow, bean and maize; with the first 3 plants a temperature of 32° C. was established as the upper limit at which they preserve their viability. A table is presented showing the total content of soluble substances and electrolytes on the basis of which the heat resistance of the aforesaid plants could be judged.

2454. FARRANT, J. L., ROBERTSON, R. N., AND WILKINS, M. J.

The mitochondrial membrane.

Nature, 1953, 171: 401-2, bibl. 8, illus.

In an electron micrograph of red beet mitochondria prepared in a 30% sucrose solution and shadowed with uranium the particles appear as compact spheres suggesting the uptake of water in this solution of low osmotic pressure. In a second micrograph prepared in 0.45% potassium chloride and similarly shadowed the particles appear as diffuse discs possessing distinct morphological membranes. This confirms the suggestion originally made by Bucholz [*Amer. J. Bot.*, 1947, 34: 445], that mitochondria possess membranes, but

it remains to be determined whether the membrane has semi-permeable properties and is responsible for the osmotic properties of the particle.—C.S.I.R.O., Melbourne and Sydney.

2455. BONNER, J., AND MILLERD, A.

Oxidative phosphorylation by plant mitochondria.

MILLERD, A.

Respiratory oxidation of pyruvate by plant mitochondria.

Arch. Biochem. Biophys., 1953, **42**: 135-48, bibl. 13; 149-63, bibl. 12.

1. Mitochondria of a higher plant, the mung bean, are capable of carrying on phosphorylation at the expense of substrate oxidation.

2. Cytoplasmic particles isolated from mung bean seedlings can oxidize all of the acids of the Krebs cycle. The oxidation of pyruvate is dependent upon the concomitant oxidation of a catalytic amount of one of the di- or tricarboxylic acids.

2456. VERVELDE, G. J.

Zoutophoping door plantenwortels. (Salt accumulation by plant roots.) [English summary.]

Thesis, Wageningen, 1952, pp. 90, illus., from abstr. in *Neth. J. agric. Sci.*, 1953, **1**: 60-1.

The relationship between the ionic composition of the outermost layer of the plant root and the composition of the medium is essentially the same as in a system known as a Donnan equilibrium. Transport of ions through the root substance can be effected by osmotic forces resulting from concentration gradients and electric forces resulting from gradients in the electrical potential. Salt accumulation is regarded as a two-phase process: (a) formation of organic acids in young tissue leading to the adsorption of mineral anions, and (b) deacidification followed by cation absorption and salt accumulation. There are theoretical grounds for believing that salt accumulation is most intensive at points where the pH is near the isoelectric pH.

2457. CHARLES, A.

Uptake of dyes into cut leaves.

Nature, 1953, **171**: 435-6, bibl. 1.

The uptake of acid and basic dyes and antibiotics by cut leaves of *Atropa belladonna* and *Prunus laurocerasus* was studied. Acid materials were absorbed and translocated to all parts of the vascular system rapidly but basic materials only slowly.—Oxford Medicinal Plants Scheme, Department of Botany, Oxford.

2458. WEATHERLEY, P. E.

On the uptake and hydrolysis of sucrose by leaf tissues.

New Phytol., 1953, **52**: 76-9, bibl. 6.

Experiments are described which lead to the conclusion that leaf discs of *Atropa belladonna* can absorb sucrose without the help of external hydrolysis.—University of Nottingham.

2459. SISAKJAN, N. M., AND VASILJEVA, N. A.

Biochemical changes in morphologically unchanged vegetative hybrids. [Russian.]

Doklady Akad. Nauk S.S.R., 1952, **86**: 1005-8, bibl. 5.

Results of experiments with grafted tomato varieties have shown that, irrespective of morphological changes,

the physiological and biochemical characters of the seedling progenies differed considerably from those of the original forms.

2460. VON CZARNOWSKI, C.

Untersuchungen zur Frage der Nektarabsonderung. (Investigations on the question of nectar secretion.)

1. *Z. Bienenforsch.*, 1952, **1**: 171-3, from abstr. in *Bee World*, 1953, **34**: 95-6.

2. *Arch. Geflügelz. Kleintierk.*, 1952, **1** (1): 23-44, from abstr. in *Bee World*, 1953, **34**: 96.

1. Various treatments affecting carbohydrate synthesis and transport within the plant were applied to both herbaceous and woody species, in an attempt to clarify the relationship between nectar secretion and plant metabolism. Following reduction of photosynthetic activity by total or partial darkening of the plants, or leaf removal, the amount of sugar secreted by the flowers dropped. Removal of the bark by ringing also caused a reduction of nectar sugar, and the greatest decrease occurred when flowering shoots were both ringed and defoliated.

2. The above-mentioned experiments are described in detail. Measurements of nectar yield from herbaceous plants placed in darkness showed that the maintenance of normal secretory activity was dependent on photosynthesis. Application of treatments which interfered with normal translocation in herbaceous and woody shoots showed that secretion was influenced by transport of soluble carbohydrates through the sieve tubes. The amount and sugar concentration of nectar secreted also decreased after defoliating treatments; it is suggested that the availability of carbohydrate supplies close to the nectary tissues is more important than that of supplies from more distant parts of the plant. Water conducted through the xylem vessels, which is not used for transpiration, may be supplied to the nectary tissues in varying amounts available for secretion. The amount and concentration of nectar secreted when flowers were placed in sucrose solutions of different concentrations increased the concentration of the feeding solution until this approached a level claimed to equal that of the phloem sap. The significance of the conclusions drawn from these physiological experiments is discussed in relation to the possibility of increasing, by the application of fertilizers, nectar secretion in crops important for honey bees.—Inst. fur Bienenkunde, Berlin-Dahlem.

2461. WYKES, G. R.

The influence of variations in the supply of carbohydrate on the process of nectar secretion.

New Phytol., 1952, **51**: 294-300, bibl. 16.

In field trials involving the ringing and defoliation of flowering shoots of horse chestnut, it was found that the supply of carbohydrate may become a limiting factor for nectar secretion. In sugar-feeding experiments in the laboratory with apple, loganberry and medlar, it was found that the concentration of nectar and amount of sugar secreted varied directly with the sugar concentration of the feeding solutions, whereas the weight of nectar did not. Differences in the types of sugar supplied did not appear to influence nectar content.—Rothamsted exp. Stat.

2462. SHIELDS, L. M., AND SATTLER, F. W.
Xylem development of young internodes of
the Kentucky Wonder bean.

Bot. Gaz., 1952, 114: 243-8, bibl. 6, illus.

The rate of stem elongation in Kentucky Wonder bean is related to internodal length, pith cell number, the lignification pattern of the earliest differentiated xylem, and the ratio of total spiral to total annular elements. The rate of elongation has no appreciable effect on the total length of individual pith cells or the spacing of spiral or annular markings in the first differentiated, longest internode.—New Mexico Highlands Univ., Las Vegas.

Growth substances.

(See also 2516u, 2580, 2632, 2633, 2635-2637, 2639-2646, 2724, 2725, 2745, 2755, Section on Weeds and Weed Control, 3064, 3118, 3156, 3164, 3167, 3346, 3366, 3367, 3439, 3440.)

2463. HARLAND, S. C.

Plant hormones.*

J. roy. Soc. Arts, 1953, 101: 298-313.

The various hormones associated with root-, leaf-, stem- and embryo growth and wound healing are considered in turn, and the use of synthetic growth substances in agriculture and particularly horticulture is outlined.

2464. BONNER, J., AND BANDURSKI, R. S.

Studies of the physiology, pharmacology, and biochemistry of the auxins.

Annu. Rev. Plant Physiol., 1952, 3: 59-86,
bibl. 147.

This review does not attempt to cover the entire field of auxin physiology but is confined to a few aspects of the subject in which particular progress has been made in recent years. These aspects include the chemical nature of native auxins, structure and activity, auxin antagonists, auxins and flowering, and effects of auxins on individual enzyme systems, plant composition, respiration and growth, and water uptake.

2465. BENNET-CLARK, T. A., AND KEFFORD, N. P.

Chromatography of the growth substances in plant extracts.

Nature, 1953, 171: 645-7, bibl. 5.

All shoot and root materials of pea, broad bean and other etiolated seedlings were found to contain hormones α and β and indole-3-acetic acid. No information on the nature of α and β is available, but the possibility that α is auxin-*a* exists. The techniques used are described.—King's College, London.

2466. HANCOCK, C. R., AND BARLOW, H. W. B.

The assay of growth substances by a modified straight growth method.

A.R. East Malling Res. Stat. for 1952, 1953,
A36, pp. 88-94, bibl. 9.

A modified straight growth technique is described in which *avena coleoptile* sections are contained with small volumes of solutions in specimen tubes; these are rotated on a horizontal axis to prevent geotropic curvature of the sections. Under these conditions growth is greater than in the usual method in which sections are threaded on capillaries and floated on solutions in dishes. This technique is applied to the

estimation of growth substances separated from plant extracts by paper chromatography, the methods of which are described. In the acid fraction of the extract, a growth promoting substance which appears to be 3-indolylacetic acid, and an inhibiting substance, are present in very young apple leaves (Crab C rootstock), while two other promoters are present in the older leaves. The neutral fraction shows widespread inhibition, which may be due to pigments and other solids present in this fraction. Where these do not occur in great quantity there are indications of two growth-promoting substances. Growth-promoting and inhibiting substances similar to those in the leaves are found in extracts of internodes. The growth substances shown here-to-be present in Crab C leaves and stems would appear to correspond with those recorded by other workers in various plant materials. [Authors' summary.]

2467. TELES PALHINHA, R.

On the flowering of *Aporocactus flagelliformis* (Miller) Lem.

Portugal. Acta biol., 1952, 3: 275-80, bibl.
13, illus.

In small-scale experiments with *Aporocactus flagelliformis* it was found that flowers did not develop on stems of which the tips were intact, but only on those of which the tips had died or been cut off. Girdling did not induce flowering. If more than one flower bud appeared on a stem, only one developed, and when two stems on the same plant bore a flower bud the development of one was inhibited until after the other had flowered. It is considered that these observations support the theory that flower initiation is promoted by substances of the auxin type.—*Bot. Inst. Lisbon*.

2468. ROBERTS, R. H.

A naturally occurring anti-auxin.

Science, 1953, 117: 456-7, bibl. 3, illus.

The warm chloroform-soluble fraction of extracts from flowering plants was shown to exert a marked anti-auxin effect, which was demonstrated, among other test plants, on tomatoes. Crystallized extract, when placed in slits in the fourth internode from the base, was found to counteract the effect of indoleacetic acid treatment. In a second experiment the usual crown gall symptoms appeared on tomato plants inoculated with *Agrobacterium tumefaciens*. All the responses, which are typical auxin effects, were related to the high auxin level associated with the developing galls. On plants treated with the extract prior to inoculation, early growth of the galls was slower, and leaf epinasty, adventitious rooting, and cambial activity were much reduced. Treated plants also made normal terminal growth.—*Dep. Horticulture, Univ. of Wisconsin*.

2469. WAGGONER, P. E., AND DIMOND, A. E.

Crown gall suppression by anti-auxin.

Science, 1953, 117: 13, bibl. 4.

Experiments with carrot roots inoculated with *Bacterium tumefaciens* show that maleic hydrazide, which is known to increase enzymatic destruction of indoleacetic acid, suppresses gall formation by affecting tumour enlargement, not by affecting alteration of normal to tumour cells or by affecting pathogen multiplication. In these respects MH suppresses galls in the same way as does ionizing radiation. The hypothesis that radiation

* Fernhurst Lecture.

suppresses galls by depressing the auxin level thus receives support.—Conn. agric. Exp. Stat., New Haven.

2470. DAVIS, D., AND DIMOND, A. E.

Inducing disease resistance with plant growth-regulators.

Phytopathology, 1953, 43: 137-40, bibl. 25.

The chemotherapeutic activity of certain plant growth regulators was investigated in relation to fusarium wilt of tomato at the Department of Plant Pathology of the Connecticut Agricultural Experiment Station. Treatment was applied before or after inoculation. 2,4-D, alpha-naphthaleneacetic acid, triiodobenzoic acid, beta-naphthoxyacetic acid and indole-3-acetic acid applied 10 days before inoculation reduced vascular discoloration to 0, 0, 41, 55 and 67% of the untreated controls respectively. The chemotherapeutically active regulators were relatively poor fungitoxicants *in vitro*. Symptoms of the metabolic changes induced in the hosts by the chemotherapeutically active growth regulators were (1) formative effects, (2) reduced weight, and (3) decreased reducing sugar content. The chemotherapeutic activity of the regulators was directly related to the interval between inoculation and treatment, becoming greater with increasing interval between treatment and subsequent inoculation [see also *H.A.*, 23: 1471].

Polyploidizing agents.

2471. ESSER, K.

Eine Eintauchmethode zur Colchicinbehandlung. (An immersion method of colchicine treatment.)

Züchter, 1953, 23: 148-50, bibl. 10; illus.

A simple method of immersing the shoot tips of seedlings in a colchicine solution is described and illustrated. With plants treated in this manner root injury is avoided and hardly any diploid lateral shoots are formed. Although originally designed for the treatment of dicotyledons, the technique can also be adapted for monocotyledons.—Cologne University.

Culture media.

(See also 3646.)

2472. KRUYT, W.

De cultuur van planten-embryo's *in vitro*; planten-physiologische en praktische betekenis. (The culture of plant embryos *in vitro*; physiological and practical value.) Reprinted from *Vakblad voor Biologen*, 1951, 31 (10): 181-93, bibl. extensive.

The literature is reviewed with reference to historical development of the technique, methods of embryo culture, plants which have been successfully cultured, problems which have been investigated by means of embryo culture, and the practical value of the technique.

2473. VYVYAN, M. C., AND TROWELL, G. F.

A method of growing trees with their roots in a nutrient mist.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 95-8, bibl. 6, illus.

A method is described for growing trees with their roots in a fine mist of nutrient solution. The mist is produced by atomizers working on the scent-spray principle. The mist condenses and runs back into the

tank, thus the solution circulates without passing through a pump. [Authors' summary.]

Seeds and seed treatment.

(See also 3641.)

2474. SIEGEL, S. M.

Secretion of phosphorylase by red kidney bean embryos.

Bot. Gaz., 1952, 114: 139-41, bibl. 4, being *Contr. Hull bot. Lab.* 636.

It is shown that phosphorylase is secreted by intact tissues of red kidney bean embryos, and the suggestion is made that secretion of enzymes may be of significance in the development of embryos.

2475. POLJAKOFF-MAYBER, A.

Germination inhibitors and plant enzyme systems. I. Catalase.

Bull. Res. Coun. Israel, 1952, 2: 239-45, bibl. 17.

Germinating lettuce seeds [of the light-sensitive variety Grand Rapids] show a rise in catalase activity shortly after being put into water. This rise is followed by a fall of catalase activity between the second and fourth hour of germination. It then rises again and continues to increase parallel to the progress of the germination process and the development of the seedlings. Light increased the percentage of germination, but inhibited, *in vivo*, the catalase activity. There was no inhibition of enzyme activity by light *in vitro*. *In vitro*, coumarin did not affect catalase activity of lettuce seeds germinated in the light or in the dark. *In vivo*, coumarin did not prevent the formation of catalase in the seeds, although it prevented their germination. Thiourea did not induce any change in germination percentage when conditions were favourable—in the light; but increased the percentage under unfavourable conditions—in the dark. *In vivo*, thiourea inhibited catalase activity of germinating lettuce seeds. The longer the seeds were in contact with thiourea, the stronger was the inhibition of the enzyme activity. Catalase activity failed to differentiate between seeds physiologically different but morphologically alike. Treatments which improved the conditions of germination (light, thiourea) caused a fall in catalase activity. [Author's summary.]—Dep. Bot., Hebrew Univ., Jerusalem.

2476. DELMAS, L.

Action de tocophérol sur la germination.

(The effect of tocopherol on germination.)

Ann. agron. Sér. A, 1952, 3: 526-7.

In view of the presence of tocopherol in the embryos of seeds the effect of applying vitamin E at different rates on seed germination and seedling growth was studied in the laboratory, chicory being one of the plants used. The germination rate was higher in the treated chicory seed than in the control (84.97 seeds germinated compared with 77) and growth was better in the treated seedlings (1,180-1,445 g. total weight of stems and roots compared with 1,170).—Stat. agron. Grignon.

2477. SÉCHET, J.

La résistance au froid des semences printanisées. (The resistance to cold of vernalized seed.)

C.R. Acad. Agric. Fr., 1953, 39: 265-7, bibl. 2.

It has been established that plants grown from vernalized seed have enhanced resistance to low temperatures. Radish seedlings from seed vernalized for 34 days and having radicles 8-10 mm. long showed greater resistance than those vernalized for 12 days when subjected to a temperature of -10° C. for 24 hours after a similar period at a normal temperature (15° C.). All the seedlings which survived gave normal plants.

2478. BARTON, L. V.

Seed storage and viability.

Contr. Boyce Thompson Inst., 1953, 17: 87-103, bibl. 22.

The effect of extended storage under various conditions on the viability of seeds of trees (*Abies*, *Pinus*, *Picea*, *Ulmus*), vegetables (*Daucus*, *Solanum*, *Lactuca*, *Allium*, *Capsicum*, *Lycopersicon*), dandelion (*Taraxacum*), flowers (*Callistephus*, *Verbena*, *Gladiolus*, *Delphinium*, *Paeonia*), and cotton (*Gossypium*) is reported. Results showed: the advantage of reduced moisture content and sealed containers; rapid deterioration at laboratory temperature and in a saturated atmosphere at 5° C.; retention of high germination capacity for approximately five years in sealed storage at 5° C., and for ten years or longer at -4° C. The importance of an unbroken seal from the time of storage until the time of germination is emphasized, since fluctuation in moisture content of the seeds caused by repeated opening and sealing of the storage container is harmful. A discussion of some of the storage effects and their practical significance is given.

2479. EIFRIG, H.

Die Verwendung von Leuchtstoffröhren im Artenechtheitslaboratorium. (The use of fluorescent tubes for seed testing.)

Saatgut-Wirtsch., 1953, 5: 41-4, bibl. 17.

The testing of *Brassica* and *Lactuca* seed for trueness to variety was carried out in artificial light, using several proprietary makes of fluorescent tube. The tabulated data and growth curves show that light from one type of tube favours the longitudinal growth of the hypocotyl, and light from another the development of the first leaf. Consequently, both types of tube are now used in conjunction at the laboratory of the Samenprüfstelle, Münster, Germany.

2480. JACKS, H.

A seed-dressing apparatus for the smaller seedsmen.

N.Z. J. Sci. Tech., Sect. B, 1953, 34: 249-51, illus.

A description and diagrams are given of a small electrically-powered seed-dressing apparatus (capacity 30-40 lb. peas) designed to give ease of operation and optimum coverage.—D.S.I.R., Auckland.

Nutrition.

(See also 2516x, 2517a.)

2481. HEWITT, E. J.

Metal interrelationships in plant nutrition.

I. Effects of some metal toxicities on sugar beet, tomato, oat, potato, and marrowstem kale grown in sand culture.

J. exp. Bot., 1953, 4: 59-64, bibl. 12.

Sugar beet, tomato, potato, oat and kale were grown in sand culture with additions of several "heavy" metals

including Cr, Mn, Co, Ni, Cu, Zn, Pb, Cd, V and Mo in equivalent concentrations. It was shown that several of these "heavy" metals, especially Cu^{++} , Co^{++} , and Cd^{++} , may induce symptoms of iron deficiency more readily than does manganese. The visual responses to CO^{++} and Ni^{++} varied greatly with the crop tested. Cu^{++} , however, always induced typical iron deficiency. Crop susceptibility also varied greatly. For example Cu^{++} readily caused chlorosis in beet, tomato and potato, but not in oat and kale. The appearance of apparent Mn deficiency in tomato and potato plants which had been given Ni^{++} , in sugar beet given Zn^{++} , and in tomato given Co^{++} , suggests that other micronutrient deficiencies may result from heavy metal excesses, and that Ni^{++} and Co^{++} in particular may disturb Mn metabolism.—Univ. Bristol Res. Stat., Long Ashton.

2482. LIBBERT, E.

Die Wirkung der Alkali-und Erdalkalitionen auf das Wurzelwachstum unter besonderer Berücksichtigung des Ionenantagonismus und seiner Abhängigkeit von Milieufaktoren. (The effect of alkaline and alkaline earth ions on root-growth, with special reference to ion antagonism and its relation to environmental factors.)

Planta, 1953, 41: 396-435, bibl. 31.

The method used in this study of the root growth of seedlings is largely based on Moewus' cress root test [*H.A.*, 19: 2674], with the difference that the seed was germinated in solutions and not on filter paper. Tests were carried out on *Lepidium sativum* and *Agrostemma githago* with the chlorides of Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba, and with the nitrates of Na, K, Mg, Ba at concentrations ranging from m/10 to m/100,000. In dilute solutions all ions had an unspecific growth-promoting effect, as compared with aqua bidest. With bivalent ions the growth-promoting action occurred at lower concentrations than with univalent ions, but eventually the growth promoting value was the same for all ions. Ca has, moreover, a specific growth-promoting action. The ions are listed in the order of their toxicity and the detoxicating and antagonistic effects of some ions on others are discussed. If one ion was present in optimum concentration, root growth could not be further promoted by adding another ion, except Ca. Illumination of the seedlings and low temperature (18° instead of 23° C.) had an inhibiting effect on root growth but did not affect ion antagonisms. The action of filter paper on root growth is partly explained by antagonistic phenomena. A theory of ion antagonism is put forward.—Inst. f. landwirtschaftliche Botanik, Berlin (East).

2483. WORT, D. J.

Physiological aspects of micro-nutrient sprays and dusts.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf. 1952, Winnipeg, pp. 6-8.

After indicating the role played by micro-elements in the formation of the prosthetic groups of enzymes, and the advantages of their foliar application, a trial is described in which the effects of various compounds applied to cereal and bean foliage were tested. Molyb-

denum proved to be the most promising element, either alone or in combination, increasing the yields of the cereals.

2484. HUNTER, J. G., AND VERGNANO, O.

Nickel toxicity in plants.

Ann. appl. Biol., 1952, **39**: 279-84, bibl. 16.

Ni toxicity was studied in turnip, bean, cabbage and other crops in Aberdeenshire. The effect of Ni on growth and on the development of necrosis and chlorosis is related to the existing Ni content and the nutrient status of the plants. Degree of necrosis and reduction in growth are increased when the Ca, Mg, N and K supply is low or when the P supply is high. Chlorosis is due to induced Fe deficiency. The Ni content is usually unrelated to the major-nutrient supply but may be reduced when this is high. The best practical corrective treatment is the application of lime (unless soil pH is already high) and of N and K fertilizers.—Macaulay Institute for Soil Research, Aberdeen.

2485. LECAT, —, AND SOSA-BOURDOUIL, —.

Mesure de l'absorption foliaire par l'emploi du phosphore radioactif P^{32} . (The measurement of foliar absorption by the use of radio-active phosphorus P^{32} .)

C.R. Acad. Agric. Fr., 1952, **38***: 665-7, bibl. 1.

Under certain conditions the rate of P absorption by the leaves was found to be superior to that by the roots. Foliage sprays might, therefore, be a suitable means of correcting P deficiency in chalk and laterite soils. The experiments were carried out with the following plants grown in nutrient media or in pots containing soil: cabbage, peanut, bean, and *Datura stramonium*.

2486. HUDGINS, H. N., SMITH, C. K., AND SCHMIDT, C. M.

Bibliography of literature on potash as a plant nutrient.

[*Publ.*] *Amer. Potash Inst.*, **K. VIII**, 1953, pp. 100, and **K. IX**, 1953, pp. 57.

These supplements to the 7 preceding issues in the series [see *H.A.*, 19: 819 and 23: 1488] give abstracts of the literature reviewed from October to December, 1941, and from January to March, 1942. There are author and subject indexes.

2487. KROG, N. E.

The effects of uranium salts on higher plants.

From abstr. in *Dissert. Abstr.*, 1952, **12**: 770-1.

From experiments on flax root tissue, *Lemma minor*, and other plants it is concluded that the uranyl ion does not appear to be essential for growth but that it may act as an accessory microelement in plant nutrition.—Univ. Minn.

Soil management and irrigation.

(See also 25160, t, 2517i, 2616-2619.)

2488. IBBETT, W. C.

The uses of sawdust in horticulture.

Agriculture, Lond., 1953, **59**: 582-6, bibl. 9.

Reviewing the experiences of growers in this country

* Printed as Vol. 39 in error.

and some of the literature on the subject, the author concludes that the prejudice against the use of sawdust is unjustified, and that provided the material is properly used it has considerable value as a soil mulch and improver. It is best applied either composted or in a well rotted condition. If fresh sawdust is used, it will need the addition of at least $\frac{1}{2}$ cwt. sulphate of ammonia per ton and should be used as a mulch only.

2489. MCINTYRE, A. C.

Wood chips for the land.

Leafl. Soil Conserv. Serv., U.S. Dep. Agric. **323**, 1952, pp. 8, illus., 2 cents.

Information is given in popular form on the value and performance of wood chipping machines, and on the use of wood chips and sawdust as mulch, soil amendment and bedding material.

2490. JUDKINS, W. P.

Sawdust as mulch for the orchard and garden.

Wis. Hort., 1953, **43**: 128.

For shallow rooted crops a one inch mulch of sawdust is recommended, although for deep rooted plants heavier mulches may be used. Either hardwood or softwood sawdust may be used in a green or weathered condition. The dry weight of organic matter in a cubic yard of sawdust varies from 200 lb. for softwood sawdust to 300 lb. for hardwood material. If a one inch layer of hardwood sawdust is incorporated into the top 6 or 7 inches of soil the organic matter content will be increased by approximately 2%.

2491. WOLFE, L. P., JR., AND DUNN, S.

Sawdust composts in soil improvement. I. Studies on aeration, acid hydrolysis, manure, and waste materials as composting aids.

MACDONALD, W. A., AND DUNN, S.

II. Pot culture studies with compost mixtures of sawdust and manure, steam treated composts, and miscellaneous mixtures.

Plant and Soil, 1953, **4**: 223-34, bibl. 3, 235-47, bibl. 4, being *Sci. Contr. N.H. agric. Exp. Stat.* **151** and **152**.

Descriptions are given of tests of methods of composting sawdust and of trials of the resulting materials on vegetable, flower and field crops in glasshouse pot cultures.

I. (1) Three years' composting of sawdust with cow manure and soil with aeration but without moisture other than natural precipitation was not enough; (2) five months' composting of sawdust with poultry manure and fresh grass silage with extra moisture applied was not enough; (3) sawdust decomposed by acid hydrolysis and steam did not produce good growth; (4) sawdust plus fish waste composted in covered jars indoors broke down rapidly and sawdust plus chopped green vegetation much more slowly, but neither material undiluted with soil gave good plant growth; (5) nitrate was a better N source than urea for plants grown in soil plus sawdust.

II. (1) Certain mixtures of sawdust composted with poultry manure and/or green vegetation silage for one year—cf. I (2)—with extra moisture applied gave significantly greater yields of some crops than did soil controls; (2) after standing two months sawdust-poultry manure mixtures, in which the sawdust had been

treated with high pressure steam, all gave better growth of radishes than the soil controls; (3) even with abundant nutrients supplied, fresh or rotted pure sawdust did not produce tomato yields equal to the controls in soil; (4) preliminary trials with partly composted shavings and waste bark mixtures were promising.

2492. GARDNER, W. H.

Synthetic soil conditioners and some of their uses.

Proc. 48th annu. Mtg Wash. St. hort. Ass.
1952, pp. 115-22, bibl. 9, illus.

Some 30 products represented as being synthetic conditioning agents for soil are now marketed in the United States. Basically most of the legitimate materials have as their conditioning agent some form of hydrolysed polyacrylonitrile (HPAN), though one of the most effective conditioners of a slightly different type is a modified vinyl acetate maleic acid compound (VAMA). In addition there are other chemical, natural mineral, organic and biological products on the market carrying claims similar to those made for the new synthetic soil conditioners. At present, the greatest use of soil conditioners is in greenhouses and home gardens. Rates and methods of application, effects on soil, plant responses and research uses are discussed.

2493. ARGLES, G. K., AND MONTGOMERY, H. B. S.

Combating flood injury.

Comm. Grower, 1953, No. 2982, pp. 355-7.

Nursing flooded orchards back to health.

Grower, 1953, 39: 381-2.

A short review article on the likely results of sea and fresh water flood damage to horticultural crops and possible remedies. Among measures considered are the following: drainage, use of gypsum, mulching, pruning, generous manuring, both organic and artificial, and removal of debris. Vegetable crops found fairly tolerant of salt and hence indicated for growing among the earliest after salt water flooding are broad and horse beans, rape, kale, beetroot and spinach. The desirability is suggested of growing indicator crops in flooded areas.

2494. KERS, D., AND OTHERS.

De tuinbouw in de overstroomde gebieden.
(Horticulture in the flooded areas.) [English summary 1 p.]

Meded. Dir. Tuinb., 1953, 16: 124-50, illus., maps.

Reviews of the damage caused in the Zeeland, Noord-Brabant and Zuidholland districts of Holland by the recent flood disaster are given by government advisory officers. Maps show the acreages of the various crops grown in the flooded areas and the salt content of the flood water in the different districts.

2495. VAN DAM, J. G. C.

De behandeling van kassen en warenhuizen, die overstroomd zijn geweest met zout water. (The treatment of frames and glasshouses that have been flooded with salt water.)

Fruitteelt, 1953, 43: 293.

The advice given is to make sure that the drainage is efficient, to apply gypsum and then to water with fresh water from a sprinkler until the drainage flow shows a salt content of less than 1 g. salt per litre. Sprinkling should be discontinued at intervals to allow the soil to

drain. If suitable fresh water is not available the lights or roof should be removed to expose the soil to rain. If the drainage is good, one winter of normal rainfall should be sufficient to free the land from salt.

2496. VAN DEN BERG, C.

De gevaren van toenemende verzilting voor land- en tuinbouw. (The dangers of increasing salinization to agriculture and horticulture.) [English and French summaries 1 p. each.] *Versl. techn. Bijeenk., Commiss. hydr. Onderz.*, T.N.O. 1-6, 1952, pp. 262-8 [summaries pp. 300-1, 329-30], bibl. 10.

Work is reviewed on the dangers and possible limits of salinity in soil, irrigation and spraying water. For irrigating glasshouse crops the NaCl content of the water should not exceed $\frac{1}{2}$ g. per litre, and for spraying fruit trees 1 g. per litre. Much work has been done on the tolerance of various crops to soil salinity. An upper limit for very sensitive crops, such as beans and peas, has been found to be $\frac{1}{2}$ to 1 g. NaCl per litre soil moisture in the upper layer during spring.

2497. HELLINGA, F.

De relatie gewasopbrengst-waterstand. (The relationship between crop yield and soil water level.)

Waterschapsbelangen, 1951, 36: 38-41, from abstr. in *Meded. LandbHoogesch. Wageningen*, 1952, 52 (Referaten): 53a.

A general survey is given of the relationship between depth of rooting and the nature of the soil profile on the one hand, and the optimum soil water level on the other.

2498. DREIBRODT, L.

Über die Wirkung der Durchwurzelung verschiedener Kulturen auf die Wasserkapazität in Vegetationsgefäß. (The effect of roots on the water holding capacity of soil in containers.)

Bodenkultur, 1952, 6: 326-7, bibl. 1.

Kohl rab, tomatoes and dwarf beans were grown in containers in a sand-compost mixture supplied with water to saturation point. After the harvest it was found that the water holding capacity of the soil permeated with roots was reduced—in the case of beans by 8%—by comparison with the rootless soil at the outset of the experiment. It is assumed that, irrespective of the crop, the water holding capacity of the soil in the field also decreases with increasing root permeation. The experiments were carried out at the Institut für Kulturtechnik, Berlin-Dahlem, in an investigation on the effect of water supply on yield in vegetables.

2499. WILCOX, J. C.

Sprinkler irrigation of tree fruits and vegetables in British Columbia.

Publ. Dep. Agric., Ottawa, 878, 1953, pp. 72, illus.

A bulletin on "Sprinkler irrigation of orchards in British Columbia" was published in 1947 [see *H.A.*, 18: 110] when the newer types of sprinkler equipment were still in their infancy. Since then much information has become available from experimental work and growers' experiences. This information has been incorporated in the present publication. There is no major change in the recommendations covering

sprinkler irrigation of orchards, but information has now been included on the irrigation of vegetables as well as tree fruits. There are also new sections on "Water relations in plant and soil" and on "Desirable characteristics of sprinkler equipment".

Storage and marketing.

2500. JOSLYN, M. A., AND DIEHL, H. C.
Physiological aspects of low temperature preservation of plant products.
Annu. Rev. Plant Physiol., 1952, 3: 149-70, bibl. 171.
 A review of the literature including that on the influence of variety and maturity on successful storage.

2501. ADDEY, R. F., AND OTHERS.
Productivity Report. Fruit and vegetable storage and pre-packaging.
[Publ.] Brit. Productivity Coun., 21 Tothill Street, London, 1953, pp. 61, illus., 3s.
 This is the report of a British team of growers, wholesalers, retailers and members of the N.A.A.S. and Marketing Division of the Ministry of Agriculture on a visit to the U.S.A. in 1951 to study methods of short-term storage and pre-packaging of fruits and vegetables. The report is divided into the following sections. 1. Short-term storage, including handling, packing, grading, pre-cooling, sterilizing and waxing of produce and use of ice. 2. Characteristics and equipment of stores. 3. Storage of particular fruit and vegetable crops. 4. Rail and road transport. 5. Refrigeration during distribution at the wholesaling and retailing stages. 6. Pre-packaging. 7. Conclusions and recommendations. Among the recommendations for improvement of short-term storage in this country are the provision of pre-cooling facilities in areas of concentrated production, the greater use of cold stores for holding soft fruits and vegetables for short periods, the development of a reasonably priced hydro-cooling unit for the removal of field heat from certain kinds of vegetables, the production of adequate supplies of water ice, the increased use of dry ice during transport of soft fruit, and the amendment of regulations prohibiting the use of non-toxic fungicidal dips. As regards pre-packaging, it is suggested that there is scope for trials with the following products: spinach, mixed salads, tomatoes, choice dessert apples, peaches, dessert plums, brussels sprouts and mushrooms. Research is needed on the effects of packaging materials on particular products and on the economics of pre-packaging.

2502. VAN HIELE, T.
Gekoeld transport per spoor. I. De technische toerusting. (The technical equipment of refrigerated rail transport.) [English summary ½ p.]
Meded. Dir. Tuinb., 1953, 16: 92-100, illus.
 Investigations were carried out in the Netherlands on methods of improving the transport of fruit and vegetables by the use of refrigerated railway trucks. The use of insulated trucks with an ice chest at both ends did not ensure that the produce would arrive in good condition, and the temperature distribution in the van was very unequal. The installation of Flettner

rotary blowers, however, improved conditions in the trucks and produced a satisfactory distribution of temperature. No improvement resulted from pre-cooling the air-conditioned trucks before departure. The use of crushed ice in direct contact with the vegetables gave rise to certain difficulties that cannot at present be overcome.

2503. v. REENEN, R. M.
De afzetorganisatie van de Nederlandse tuinbouw. (The marketing organization of Dutch horticulture.)
[Publ.] Centr. Bur. Tuinb. Veilingen Nederland, 1950, pp. 52, illus. [received 1953].
 An account is given of the development, aims and organization of the auction marts, through which most of the Dutch vegetables, fruit and flowers are now marketed.

2504. VAN DEN MUIJZENBERG, E. W. B.
Ruimtelijke ligging en indeling van veilinggebouwen. (Siting and design of auction mart buildings.) [English summary ½ p.]
Meded. Dir. Tuinb., 1953, 16: 83-92, illus.
 A discussion of factors to be considered when planning an auction building, such as is used for the marketing of horticultural produce in Holland, is followed by a description of an ideal block of buildings for a fruit auction.

Machinery and apparatus.
(See also 2647-2649, 2659, 3633.)

2505. ANON.
Narrow Gauge and Orchard Fordson Majors.
Fm Mech., 1953, 5: 139, illus.
 Details are given on two newly introduced conversions of the New Fordson Major tractor. One is the Model 52 KFD Narrow Gauge Conversion; it has an overall width of only 52 in. and is designed for working in hops, soft fruits, vineyards, coffee, tea and sisal. The other is the Model 68 KFD Orchard Conversion; it was designed particularly for high power output and ease of manœuvrability in the orchard.

2506. ANON.
New manure turner.
Comm. Grower, 1953, No. 2992, p. 925, illus.
 The performance is described of the Culverwell Turner, a machine designed to turn and break up manure at the same time as spraying it with water. The machine is small enough to be used in sheds or glasshouses. Operated by 3 men, it can in 8 hours turn 25 tons of manure for the first time or 50 tons for the fourth time.

2507. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN (DINKLA, P. E.).
Wizard Simplex sproeiinstallatie. (The Wizard Simplex sprinkler installation.)
Beproefingsrapport, I.T.T., Wageningen, 1/685 [undated, received Dec., 1952], pp. 7, illus.
 This is the first of a new series of leaflets issued by the Institute for Horticultural Technique, Wageningen, reporting on tests with horticultural equipment and

machinery. In each case the equipment is described and illustrated diagrammatically, and a detailed report is made on its performance. [Leaflets 2-6 in the series deal with the Saval knapsack sprayer, the Stork-Beresford pump, a sprinkler nozzle with deflector plate, the Hola fruit grader and the Holland fruit grader.]

2508. CORBETT, W., AND GLOYNE, G. M.

Tests in low voltage soil warming.
Grower, 1953, 39: 885.

Some effects on soil and air temperatures are analysed for low-voltage soil warming equipment installed in Dutch lights at the Kent Horticultural Institute, Swanley.

2509. KUPERBERG, J., AND MURPHY, W. A.

A hydroponic mist-type plant propagator.
Proc. Fla St. hort. Soc. for 1952, pp. 201-2, bibl. 13.

Sub-irrigation gravel culture units provided with mist sprayers, constructed at the University of Miami, are described. They are being used for the propagation of tropical and subtropical plants. The following advantages are claimed for the design. (1) Control of mist production to prevent excessive moisture and consequent inhibition of rooting and leaching of nutrients from the cuttings. (2) Use of nutrient sprays as a supplementary source of nutrition. (3) Drainage and aeration of the rooting medium by sub-irrigation. (4) The possibility of supplying nutrients to the cuttings during the root development period. (5) Control of the osmotic concentration of the solution and the period of spraying to assist the hardening off process. (6) The use of frit to offset possible alkali chlorosis.

2510. BOUILLENNE, R., AND FOUARGE, M.

Etude d'un nouveau type d'éclairage fluorescent pour la culture en serre. (Laitues d'hiver et de printemps, choux, tomates.) (A new type of fluorescent lighting for greenhouses.)
Bull. hort. Liège, 1953, 8: 72-80, bibl. 1, illus.

Experiments with fluorescent lighting for greenhouses were conducted in the "phytotron" [see *H.A.*, 21: 3216] at Liège University Botanical Institute in 1952. A 150-watt 4-tube "Phytor I., C.R.H. Lg." fluorescent apparatus gave excellent results with winter and spring lettuce, and with cabbage and tomato. Used at 20° C. and 80% R.H. for 25-30 days after germination, the apparatus hastens maturity by at least 30 days compared with traditional methods of cultivation. It is most economical when used on young plants immediately after germination when they occupy a limited space. At 30-40 cm. above the soil it is effective over 1 sq. m.

2511. WITHROW, R. B., AND PRICE, L.

Filters for the isolation of narrow regions in the visible and near-visible spectrum.

Plant Physiol., 1953, 28: 105-14, bibl. 13.

Investigations of photochemical reactions in plants frequently require the irradiation of large areas with well-defined regions in the visible and near-visible spectrum. The laboratory preparation of large dyed gelatin films is very inexpensive, and these films are particularly useful because the transmission bands can be adjusted to meet the special requirements of each

problem. Their preparation is described with details of the preparation of dyed gelatin solutions, the casting of the solutions onto plate glass treated with silicones, the stripping of the films from the glass, and mounting. Transmission curves are presented for typical gelatin filters and for various concentrations of solutions of copper sulphate and ferrous ammonium sulphate as primary infra-red filters.—Smithsonian Inst., Wash., D.C.

2512. JOHN INNES HORTICULTURAL INSTITUTION.

Soil blocks.

John Innes Leafl. 12, 1953, pp. 7, 9d.

Since the first report on soil blocks [see *H.A.*, 19: 1733] numerous experiments have been carried out at Bayfordbury on the materials used for the compost, the efficiency of different block-making machines and the technique of making and using blocks. These have confirmed the fact that soil blocks are superior to clay pots for raising a number of plants, provided they are properly made and handled. Some simple rules are given for their successful use. John Innes composts are ideal for block making. The degree of compression is a most important factor, and depends on the clay content of the loam, the moisture content of the compost and the efficiency of the machine. Blocks should never be allowed to dry out, and watering should always be done with a rose. Seedlings should be pricked out as soon as they are large enough to handle. Finally advice is given on the raising of tomato, cucumber and lettuce plants in blocks. Soil blocks have also been used for carnations, cauliflowers, chrysanthemums and sweet peas, and are particularly useful for bedding plants.

2513. DOESBURG, J. J., AND GREVERS, G.

Metingen van de hardheid van verse en geconserveerde tuinbouwproducten. (Measurement of firmness of fresh and preserved horticultural products.) [French summary 15 lines.]

Reprinted from *Conserva*, 1952, 5: 150-8, bibl. 10, illus., being *Overdruk Inst. Bewaring en Verwerking van TuinbProd.*, Wageningen 36.

A new tenderometer that can be used either in the field or laboratory is described and illustrated. Results are given of experiments on its use with fresh and canned green peas, cooked potatoes, beets and turnips, and raw asparagus.

2514. SINGH, K.

An apparatus for automatic recording of losses of water from potted plants, soil, and water pans.

Ann. Bot. Lond., 1953, 17: 189-91, bibl. 4, illus.

A simple, cheap, robust apparatus based on an electromagnetic device is described.

2515. CHAYEN, J., AND MILES, U. J.

The preservation and investigation of plant mitochondria.

Quart. J. microscop. Sci., 1953, 94: 29-35, bibl. 14.

A simple and rapid method for making squash preparations of plant root tip cells is described.

Noted.

2516.

a ANDREEVA, T. F., AND PLYŠEVSKAJA, E. G. Investigation of albumen formation in the process of photosynthesis with the use of N^{15} . [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1952, **87**: 301-4, bibl. 10.

b ARISZ, W. H. Transport of organic compounds. *Annu. Rev. Plant Physiol.*, 1952, **3**: 109-30, bibl. 124.

c BARNETT, B. C., AND OTHERS. Phosphogluconic dehydrogenase in higher plants. *Plant Physiol.*, 1953, **28**: 115-22, bibl. 19.

d BLEDSOE, R. W. Radioactive tracer elements as tools in modern plant science research. *Proc. Fla. St. hort. Soc. for 1952*, pp. 7-10.

e BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE, HORTICULTURAL BRANCH. Greenhouse construction, heating and soil sterilization. *Hort. Memo. B.C. Dep. Agric.* **6**, 1948 pp. 13, illus., [received 1953].

f BURRIEL-MARTÍ, F., AND JIMÉNEZ-GÓMEZ, S. Análisis espectroquímico de Ni, Co, Zn y Mo en suelos y plantas. I. Estudio de las "bases diluyentes". (Spectrochemical analysis of Ni, Co, Zn and Mo in soils and plants. I. A study of diluting substances.) [English summary 8 lines.] *An. Edaf. Fis. veg.*, Madrid, 1953, **12**: 43-53, bibl. 19.

g ČECH, L. Způsob nepohlavního křížení trvalých rostlin. (Asexual hybridization of perennial plants.) [Russian summary & p.] *Sborn. čsl. Akad. Zeměd.*, 1952, **25**: 349-54, bibl. 5, illus. A brief discussion of Russian work on vegetative hybridization.

h CHAYEN, J., AND NORRIS, K. P. Cytoplasmic localization of nucleic acids in plant cells. *Nature*, 1953, **171**: 472-3, bibl. 14. A summary of 4 years' results, to be published in full elsewhere.

i CLOS, E. C. Catálogo general 1951 de la División de Exploraciones e Introducción de Plantas. (1951 general catalogue of the Division of Plant Exploration and Introduction, Buenos Aires.) *Publ. téc. Inst. Fitotec., B. Aires* **68**, 1952, pp. 139. Catalogue of 821 plants grown at the Acclimatization Gardens, Buenos Aires.

j DUGGER, W. M., JR., AND MORELAND, D. E. An autoradiographic technique for detailed studies with plant tissue. *Plant Physiol.*, 1953, **28**: 143-5, bibl. 8, illus.

k EICHHOLTZ, F. E. Gekoeld transport per spoor. II. De organisatie in Europa. (The organization of refrigerated railway transport in Europe.) [English summary & p.] *Meded. Dir. Tuinb.*, 1953, **16**: 100-4, illus. Organization of "Interfrigo".

l FORSSBERG, A., AND NYBOM, N. Combined effects of cystein and irradiation on growth and cytology of *Allium cepa* roots. *Physiol. Plant.*, 1953, **6**: 78-95, bibl. 35, illus.

m GILMOUR, H. S. A., LUMRY, R., AND SPIKES, J. D. Electrode reactions of isolated chloroplast fragments. *Plant Physiol.*, 1953, **28**: 89-98, bibl. 10. From Swiss chard and spinach.

n GOLDRING, E. W. The use of electricity to increase soil temperature. *Tech. Rep. Brit. elect. Res. Ass. W/T26*, 1953, pp. 11, bibl. 6, 9s. 3d. For abstract see *H.A.*, **23**: 111.

o HELLINGA, F. Verzouting en verdroging in de tuinbouw. (Salination and drying out of soils in horticulture.) *Waterschapsbelangen*, 1951, **36**: 14-16, from abstr. in *Meded. LandbHoogesch. Wageningen*, 1952, **52**: 53a.

p HEMBERG, T. The effect of vitamin K and vitamin H¹ on the root formation of cuttings of *Phaseolus vulgaris* L. *Physiol. Plant.*, 1953, **6**: 17-20, bibl. 7.

q HUNTER, H. Industry's contribution to agricultural research—XV. The Pure Seed Company. *World Crops*, 1953, **5**: 113-16, illus.

r JAMES, W. O. The terminal oxidases of plant respiration. *Biol. Rev.*, 1953, **28**: 245-60, bibl. 51.

s MASON, A. C. Note on the determination of nitrate in culture solutions. *A.R. East Malling Res. Stat. for 1952*, 1953, A36, p. 108, bibl. 2.

t MONSON, O. W. Sprinkler irrigation in Montana. *Bull. Mont. agric. Exp. Stat.* **483**, 1952, pp. 40, illus.

u VAN OVERBEEK, J. Agricultural application of growth regulators and their physiological basis. *Annu. Rev. Plant Physiol.*, 1952, **3**: 87-108, bibl. 203.

v OVERSTREET, R., AND JACOBSON, L. Mechanisms of ion absorption by roots. *Annu. Rev. Plant Physiol.*, 1952, **3**: 189-206, bibl. 20.

w PARKER, M. W., AND OTHERS.
Photoperiodic responses of plants and animals.
Nature, 1952, 169: 242-3, bibl. 6.

x PRINCE, A. L.
Boron.
Mon. Rep. on Minor Elements, Soils Dep., Rutgers Univ. 12, 1951, pp. 6, bibl. 27 [received 1953].
A review.

y RAMEAU, J. T. L. B., AND TEN HAVE, J.
De bepaling van het gehalte aan fosforzuur in plantaardig materiaal en in grond volgens de molybdeenblauwmethode met metol als reductiemiddel. (Determination of phosphoric acid in plant material and soils by the molybdenum blue method using metol as reducing agent.) [English summary 1 p.]
Reprinted from *Chem. Weekbl.*, 1951, 47: 1005-13, bibl. 13.

z REMMERT, L. F., AND OTHERS.
Determination of fluorine in plant materials.
Analyt. Chem., 1953, 25: 450-3, bibl. 12.

2517.

a RIPLEY-DUGGAN, B. A.
The determination of small quantities of boron.
Analyst, 1953, 78: 183-5, bibl. 4.
As applied to fragments of wood.

b ROBINSON, J. R.
The active transport of water in living systems.
Biol. Rev., 1953, 28: 158-94, bibl. 182.

c ROLLINS, H. A.
Horticulture in Lebanon.
Fruit Var. hort. Dig., 1953, 7: 35-6.
Vines, olives, figs, bananas, apples are among the fruits listed in this short popular account.

d SMIT, J., AND SMIT, J. A.
Spectrochemical cobalt, molybdenum and copper determinations in plants.
Analyt. chim. Acta, 1953, 8: 274-82, bibl. 15, illus.

e SPENCER, J. L.
Effects of intense ultrasonic vibrations on *Pisum*. I. Effects on root meristems. II. Effects on growth and their inheritance.
Growth, 1952, 16: 243-54, bibl. 12, 255-77, bibl. 23, being *Contr. Mass. agric. Exp. Stat.* 861 and 862.

f STUMPF, P. K.
Glycolytic enzymes in higher plants.
Annu. Rev. Plant Physiol., 1952, 3: 17-34, bibl. 105.

g ULRICH, A.
Physiological bases for assessing the nutritional requirements of plants.
Annu. Rev. Plant Physiol., 1952, 3: 207-28, bibl. 92.
Progress in the application of plant analysis.

h VENNESLAND, B., AND CONN, E. E.
Carboxylating enzymes in plants.
Annu. Rev. Plant Physiol., 1952, 3: 307-32, bibl. 145.

i VOLK, G. M.
Survey of research on new soil conditioners.
Proc. Fla St. hort. Soc. for 1952, pp. 137-42, bibl. 14, illus.

j WASSINK, E. C.
Photosynthese als biokatalytisch process. (Photosynthesis as a biocatalytic process.)
Reprinted from *Chem. Weekbl.*, 1951, 47: 968-78, bibl. 35 [received 1953].

k WILDMAN, S. G., AND JAGENDORF, A. T.
Leaf proteins.
Annu. Rev. Plant Physiol., 1952, 3: 131-48, bibl. 65.

l WOLFE, J. S., AND BULL, D. A.
Investigation into the adaptability of light agricultural tractors for horticultural use.
1. Trials of reversed Allis-Chalmers model B.
[Publ.] *nat. Inst. agric. Engng C.S.21*, 1952, pp. 14, illus., 4s.

TREE FRUITS, DECIDUOUS.

General.

(See also 2408, 2409, 2415, 2473, 2672h, 3391, 3393, 3484, 3510, 3630, 3636, 3651, 3687.)

2518. NEL, R. I.

The fruit industry in the winter-rainfall area.

Fmg S. Afr., 1952, 27: 630-5.

Among subjects mentioned in this 1951/52 report of the Western Province Fruit Research Station, Stellenbosch, are: *Pomological investigations*: Control of delayed foliation in peaches by DNC sprays and late pruning when the buds are swelling, variety trials with deciduous and sub-tropical fruits, rootstocks for stone fruits and pears, pruning of pears, peaches, guavas and olives. *Table grapes*: In addition to long-term studies on varieties, problems investigated included pruning, topping, pollination, colour development, crop thinning and bunch sizes. *Plant breeding*: Peaches, grapes, guavas and other fruits. *Soil fertility and tree nutrition*: Including fertilizing of vines, the use of radio-active

isotopes, improved spectro-chemical methods for determining K, Ca, Mg, Mn, Fe and Cu, and deep cultivation in orchards. *Diseases*: Bacterial blight of vines, bacterial gummosis, canker of apricots, apple and pear scab, and deciduous fruit viruses. *Pests*: Mainly fruit flies, mites, mealy bugs and the Argentine ant. *Cold storage of fruit*: Varieties and methods tested for peaches, apples, pears, grapes (including SO₂ storage) and pineapples. *Food technology*: Canning of fruits and vegetables, dehydration of various products including pineapples, and fruit juices.

2519. TUKEY, H. B.

Research development in fruit culture in America.*

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 47-54.

The author, who is Head of the Department of Horticulture, Michigan State College, gives a short, but

* Amos Memorial Lecture.

none the less comprehensive and entertaining, review of the many lines of research on deciduous and small fruits in which outstanding progress has been made in the United States.

2520. VICTORIA DEPARTMENT OF AGRICULTURE.
Horticultural Research Station, Tatura.

J. Dep. Agric. Vict., 1953, 51: 117-30, illus.

Notes are given on the work of the Tatura Horticultural Research Station in the Goulburn Valley, a very important area for the production of canned peaches, canned pears and canned apricots. The average annual rainfall of the district is 18 in. and irrigation is practised. Tatura Station covers 104 acres and was first planted in 1937; its soils are heavy. Experiments in progress are: peaches—irrigation, soil management, fertilizers, varieties, pruning and thinning; apricots—rootstocks and varieties; pears—rootstocks, soil management, fertilizers, irrigation, pre-harvest drop, black end and pruning; apples—rootstocks. *Peach investigations.* Soil management and irrigation: clean cultivation throughout the growing season is the best practice for young trees, but after a number of years heavy soils become compacted and water will only penetrate 8-9 in.; a trial was therefore laid down with 8 alternative treatments including no summer cultivation, permanent leguminous swards, herbicide spray, straw mulch, and no summer cultivation plus alternate bay irrigation; after 3 seasons none of the treatments gave a higher yield than clean cultivation. Timing of irrigation: growers are advised to irrigate when the soil in the root zone, withdrawn with an auger, crumbles when run between finger and thumb, or to measure a dozen fruits per block every 3 days and irrigate when 50% stop growing or, during stone-hardening in November, when 90% stop growing. Fertilizer trial: in a replicated experiment laid down in 1944, four treatments each of ammonia alone, ammonia plus superphosphate, ammonia plus K, and ammonia plus superphosphate plus K are being applied to Golden Queen; results to date suggest that 3 lb. ammonium sulphate should be applied in spring and 3 lb. in late January, that superphosphate is beneficial and K sulphate detrimental. Variety and breeding trials are in progress. Pruning and thinning: most early to midseason varieties of canning peaches set too many fruits; hand-thinning is usually essential; trees under good cultural conditions can carry about 45 fruits per inch of butt circumference. Early November thinning allows a bigger crop to be carried than the normal December thinning but there is some risk of further natural thinning; if thinning is delayed till January the number of fruits must be reduced by a further 20% to gain sufficient size. *Pear investigations.* Rootstocks: in 1941 plantings were made of Bon Chrétien, Packham, Josephine and Beurré Bosc on seedling rootstocks of Keiffer, Winter Nelis, Winter Cole, Cole's Hybrid, Beurré Bosc, Broom Park, Josephine, L'Inconnu, Packham, and Beurré de Capiaumont; Winter Nelis gives the most vigorous trees for all but Josephine; Keiffer are good for all 4 scions, Winter Cole and Broom Park are fairly good, L'Inconnu promising, and Beurré Bosc seedlings the poorest.

2521. BELOHONOV, I. V.
Achievements of Mičurin's science—in production. [Russian.]
Priroda, 1953, 42 (2): 56-61, bibl. 1, illus.

An article by the Director of the Mičurin's Scientific Research Institute for Fruitgrowing on work in progress and results attained to date. A few of the new very early, very late and exceptionally frost resistant (up to -55°C) apple varieties are listed, fruit production in forest shelter belts is described and cultivation practices and mechanization are discussed.

2522. MAURI, N.

Vers une production de pommes marocaines.

(Towards a Moroccan apple industry.)

Fruits et Prim., 1953, 23: 24-32.

Notes are given on apple growing in Morocco. Existing orchards, which are all 2-6 years old, are on various soils in 5 different districts, lie 900-1,200 m. above sea level and have an average annual rainfall of 600-900 mm. Early varieties have so far given the best results as regards yield and quality. Bushes, standards or "fruit hedges" are preferred to cordons and other dwarf forms. Vigorous rootstocks are desirable except for a few very vigorous late varieties; Malling rootstocks are the most promising. Some 30 varieties are briefly discussed under the following headings: rootstock, habit, fruit, yield and remarks.

2523. GORIN, T. I.

The quince on the lower Volga. [Russian.]

Sad i Ogorod, 1953, No. 1, pp. 35-9, illus.

Brief notes are given on the botany, propagation and soil and fertilizer requirements of quinces. In the southern regions of the lower Volga productivity is directly dependent on irrigation; for optimum yields 6-8 applications per season at 400-500 cu. m. water per ha. are recommended. Observations have shown that quince can be successfully cultivated up to 500 km. north of the accepted commercial quince growing areas, the lower Volga region as far north as Stalingrad being within this potential production area. The main characteristics of 5 recommended varieties are described.

2524. JOHNSTON, S.

Trends and new practices in peach growing.

Proc. 94th annu. Mtg Pa St. hort. Ass., 1953, 32: 32-7.

Notes on peach production as practised in Michigan relate to pruning, spraying, soil management, fertilizers, thinning, winter injury and marketing.

2525. MONTAGNAC, R.

Amélioration des plantes. G. Le figuier dans le sud-ouest de Madagascar. (Improvement of plants. The fig tree in south-western Madagascar.)

C.R. Rech. agron. Madagascar, 1952, No. 1, pp. 75-81, bibl. 12, illus.

Notes are given on indigenous, edible figs, on the introduction of *Ficus carica* including the recent introduction of cuttings of Moroccan varieties, on propagation by grafting and budding on seedlings, on planting (8×6 m.), cultural operations, caprifaciation, training (bush tree or shrub), and pests.

2526. BAPAI, P. N.

Profitable growing of the loquat.

Agriculture Anim. Husb., 1950, 6 (Sect. 2, Hort.): 10-12 [received 1953].

In the loquat (*Eriobotrya japonica*) there are 2 peak periods of flower bud formation: July-September, and October. Flowers of the first flush do not set fruit owing

to non-formation of pollen. In preliminary experiments in July, 1949, to improve yield the terminal buds of 5 loquat trees were removed. The deblossomed portions sent out laterals which formed flower buds in October-November, suggesting that yield can be increased by diverting the tree from flower development to vegetative growth in the early part of the season. The Golden Yellow and Pale Yellow varieties were both found to be self-incompatible.

2527. FAUST, L. J.

How to make plants dwarf.

Brooklyn bot. Gdn Rec., 1952/3, 8: 282-9,
bibl. 2, illus.

In this report of an interview with Dr. Karl Sax an account is given of some of the methods being investigated at the Arnold Arboretum for dwarfing ornamental and fruit trees. Mention is made of various dwarfing rootstocks for apples, pears, peaches, plums and ornamental chokeberry, inversion of bark rings, knotting the stem of the rootstock, and inverting buds to produce strong crotches.

Breeding and varieties.

(See also 2471, 2672b, e, i, n, o.)

2528. GRANHALL, I., AND OTHERS.

X-ray effects in fruit trees.

Reprinted from *Hereditas*, 1949, 35: 269-79,
bibl. 7, illus. [received 1953].

With a view to producing vegetative mutations, X-ray treatment was given to apple, pear and cherry scions in a series of preliminary experiments carried out from 1944 to 1948 at Balsgård Fruit Breeding Institute and Alnarp State Horticultural Research Station, Sweden. The most suitable strength of radiation for apples and pears appeared to be 5,000 r-units, and for cherries 2,500 r-units. Stronger dosages were often lethal. The most typical primary effects were the bifurcation of shoots and leaf midribs. Diploid varieties responded much more frequently than triploids or tetraploids. Variations in fruit colour, noted in the apples Åkerö, Gravenstein and Cox's Orange, were probably permanent deviations induced by the X-ray treatment. Two variations observed in the fruit shape and time of ripening of Williams' pears are described. The possibilities of inducing vegetative mutations in fruit trees by means of X-rays are discussed. [See also *H.A.*, 20: 2314.]

2529. STANTON, W. R., AND SINCLAIR, W. K.

The distribution of P^{32} in the plum and its mutagenic possibilities.

J. exp. Bot., 1953, 4: 78-86, bibl. 19, illus.

The occurrence and utility of bud sports in fruit trees are discussed and the merits of various mutagenic agents compared. P^{32} is suggested as a suitable mutagen in fruit tree mutation studies and experiments are described on the uptake and distribution of P^{32} in plums. The uptake in ten 3-year-old trees cultured in sand appeared to be of the order of 10% to 30% increasing with the vigour of the tree. The P^{32} was distributed mainly in the shoots, the average initial concentration being 1.5 μ c./g., and in their buds, average initial concentration 3 μ c./g. The latter figure corresponds to a dose to the buds of the order of 2,000 r., and although this is a dosage level at which

mutagenic effects are likely to occur, there was little sign of macroscopic damage. The method therefore appears to be a suitable one for fruit trees. [Authors' summary.]

2530. SOKOLOVA, E. P.

The effect of the age of the pistils on the success of hybridization. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1951, 81: 937-40, bibl. 4.

In an investigation on apple, pear, cherry, black currant and raspberry with reference to intergeneric hybridization and the age of the pistils when pollinated, the following conclusions were drawn. For the success of the fertilizing process and its selectivity the age of the pistil must be taken into consideration. In inter-specific hybridization a better set of fruit is obtained by pollinating the mature pistils than by pollinating the young or the over-ripe pistils. In "distant" hybridization (intergeneric) the highest percentage is obtained by pollinating the young and the old pistils.

2531. SCHMIDT, M.

Beiträge zur Züchtungsforschung bei Kirschen. I. Phaenologische und pomologische Untersuchungen an Süßkirschensämlingen.

(Contributions to research on cherry breeding. I. Phenological and pomological investigations on sweet cherry seedlings.)

Züchter, 1953, 23: 97-115, bibl. 13, illus.

The paper gives an account of the first phase of an ambitious cherry breeding scheme which was initiated in the nineteen-twenties and later suffered many vicissitudes from frost (1939-42), war and post-war conditions, loss of important records, etc. What remains, however, is still an important body of data and observations relating to sweet cherry seedlings obtained from crosses at Halle University and planted out at the Erwin Baur Institut, Müncheberg. Records were begun in 1932, when the trees first flowered, but full phenological and pomological data are presented only for the periods 1935-41 and 1947-52. The report is concentrated on six seedlings from a cross of the varieties Flamentiner \times Frühest der Mark, of which four have been widely propagated and distributed. Two of these seedlings, viz. No. 7 and 13, have been submitted for registration as varieties, while two others are still under observation. Seedlings No. 7 and 13 are considered to be valuable additions to the existing cherry varieties, as they combine earliness with high quality, No. 13 being particularly early. Yields of No. 7 are stated to be very satisfactory, but figures have not yet been published. The detailed data presented on the six seedlings include information on: Beginning and duration of flowering; time of leafing out; increase in fruit size; colouring of the developing fruit; relations between ripening and weather; time of harvest; fruit size and shape; fruit stalk; fruit skin and flesh; fruit weight; shape, size and weight of stone; flavour; and pollination. Observations on the behaviour of worked trees in nursery and orchard will be recorded at a later date.

2532. RODIONOV, A. P.

Vegetative hybrids of peach with apricot. [Russian.]

Izv. Akad. Nauk S.S.S.R., Ser. biol., 1953, No. 1, pp. 36-45, bibl. 7, illus.

Peach grafted on apricot produced fruit of improved quality slightly resembling apricot. Apart from theoretical interest this may be of value for the sandy regions of the Ukraine where apricot can be grown with success, but not peach. Trials with the seedlings from vernalized and non-vernalized peach seeds grafted on young apricot seedlings to improve the frost resistance of "apricot-peach" are described.

2533. BROOKS, R. M., AND OLMO, H. P.
Register of new fruit and nut varieties. List 7.
Proc. Amer. Soc. hort. Sci., 1952, 60:
 497-504.

The new list contains short descriptions of the following new varieties: 3 apples, 1 avocado, 3 blueberries, 1 gooseberry, 1 grape, 1 grapefruit, 4 nectarines, 9 peaches, 1 persimmon, 2 plums, 1 prune, 2 raspberries, 7 strawberries, and 2 walnuts. [See also *H.A.*, 23: 2371.]

2534. KNUTH, F. M.
The fruit variety trials at Knuthenborg.
Mimeo. Publ. Knuthenborg, Bandholm,
 Denmark, 1951, pp. 6.

A list is given of some 200 varieties and improved strains of apple that have been collected from various countries for testing under Danish conditions. The collection is at Knuthenborg, but parallel trials are being conducted in other parts of the country with 25 of the most promising clones.

2535. SORTSUDVALGET.
Foreløbig beretning fra Faellesudvalget for Frugtavlsøkonomi om nyere aeblesorter. (Preliminary report on new apple varieties by the committee on the economics of fruit growing.)
Erhersfrugtavl., 1953, 19: 197-200.

The committee was set up in March, 1951, and growers and advisory officers were asked to send in samples of apples from varieties that were thought to deserve cultivation in Denmark. As a result of storage tests, carried out at Blangstedgaard, two varieties are recommended to the attention of the growers in this first preliminary report: Cortland, a descendant of McIntosh, and Golden Delicious. Nine other varieties are also discussed.

2536. DEKKER, P.
De perzik als struikvorm. (Growing peaches as bush trees.)
Cult. Hand., 1953, 19: 99-101, illus.

Growing peaches as bush trees in the open in Belgium and the Netherlands is exceptional. Varieties resistant to spring frost damage may offer a solution to the problem, and notes are given on some such promising varieties, including Kwekersgoud, Bloedkoraal, Dr. X and Bella Donna.

2537. SLOVIĆ, D.
The pollination relations of the Jugoslav pear variety Takuša with foreign varieties. [Serbian, English summary ½ p.]
Annu. Fac. Agron. Sylvic. Skopje, 1949/50,
 1951, 3: 200-6, bibl. 3 [received 1953].

The productive, disease resistant but small-fruited, self-sterile local pear variety Takuša was cross-pollinated with several high quality varieties. Marie Louise,

Beurré Bosc, Jeribasma and Gospodinka gave the most promising results.

Propagation and rootstocks.

(See also 2466, 2629, 2672j, m, r, 3421, 3684.)

2538. TROŠIN, N. N., AND MEDVEDEVA, T. M.
Hastening the raising of fruit trees. [Russian.]
Sad i Ogorod, 1953, No. 1, pp. 22-4.

Stratified apple and pear seeds were sown in flats and held at 16-22° C. from 20 March to 10 April. After 5-7 days the seed germinated and when the rootlets were 1 cm. long the seedlings were transplanted either into soil blocks placed in frames or direct into the frame soil. On 15-21 May the seedlings were transferred to the nursery, watered, and mulched with stable manure. Irrigation combined with a 100 kg. per ha. ammonium sulphate application was carried out during the first part of June, and was repeated with a 150-200 kg. application of the same fertilizer about a month later. By August the apples had reached an average height of 60-80 cm., the pears 30-50 cm., and were budded. The plants overwintered well and within 2 years produced saleable trees, thus reducing the time required from sowing to planting out from 4 to 3 years.

2539. MIRZOEV, K. D.
An attempt to accelerate the raising of apple trees. [Russian.]
Sad i Ogorod, 1953, No. 1, pp. 24-5, illus.

A method, tested in Azerbaijan, is briefly described which produces saleable apple trees, including standards in 3 seasons. Stratified seed of wild apples was sown in the open in the middle of March, the seedlings were transplanted soon after germination and in September of the same year they were budded. The following season the stems grew to an average height of from 208 to 255 cm., and the third year they were trained as required.

2540. LURJE, I. G.
Replacing pricking-out by sowing stratified seedlings with cut radicles. [Russian.]
Sad i Ogorod, 1952, No. 2, pp. 6-10, illus.

The conventional method of pricking out apple seedlings when the first true leaves appear can be replaced by one in which the seedlings are pricked out at the "key" stage, i.e. before the cotyledons are free from the seed coat. Experiments are described in which the radicles of stratified "key" seedlings of woodland apples and pears were cut back to the base or by ½ or ⅓ of their length to induce root branching and the production of fibrous roots, before placing the seedlings in boxes for further development. The seedlings with radicles cut back by ½ or ⅓ appeared above the soil in 10-12 days, those with radicles cut right back in 13-14 days. Successful field trials with such seedlings raised for rootstocks are recorded.

2541. LESLEY, J. W., AND BONNER, J.
The development of normal peach seedlings from seeds of early-maturing varieties.
Proc. Amer. Soc. hort. Sci., 1952, 60:
 238-42, bibl. 6, illus.

Embryos of the very early maturing peach varieties, Robin and Florence, the latter having a development period of about 74 days, failed to develop in sterile

culture in various media under external conditions favourable for growth, but if the fruit was stored a few days before maturity at about 2° C. for seven weeks the embryos grew and developed normally. Embryos of Mayflower, of which the fruits have an even shorter development period, nearly all failed to grow after the same treatment. A series of biologically active substances added to the culture medium had no obvious effect on seed viability. The tallest seedlings were those which received *p*-amino benzoic acid as a supplement. Cold storage of the fruit did not appreciably increase embryo size but apparently prevented the dissolution of the embryo, which occurs in after-ripening of early peaches, and increased its viability. The use of even earlier-maturing varieties than before as seed parents in hybridization is possible by cold storage of the fruit previous to embryo culture. [Authors' summary.]

2542. FLOOR, J.

Proeven met vermeerdering door ensteken. (Experiments on propagation by grafted cuttings.) [English summary 1½ p.]
Meded. Inst. Vered. Tuinbouwgew. 40, 1952, pp. 26, bibl. 11, illus.

Experiments were carried out from 1948 to 1951 to determine whether the propagation of plants that do not root easily could be facilitated by approach grafting the cuttings before planting with cuttings of a closely related, easily rooting species. The test plants included several varieties of apple and pear, *Pyrus nivalis*, *P. elaeagrifolia* and *Amelanchier laevis* all grafted with quince, May Duke cherry and several varieties of plum grafted with Marianna plum, and *Populus tremula* and *P. lasiocarpa* grafted with *P. nigra* var. *italica*. In 1948 promising results were obtained with Nouveau Poiteau pear, but later results were disappointing. Fairly good results were obtained with Yellow Transparent apple, 8 plum varieties, *Amelanchier laevis* and *Populus tremula*. It is concluded that the method has possibilities for research purposes but needs simplification for commercial purposes. A simpler method that proved successful with *Populus tremula* was side grafting with roots or rooted cuttings. It was found that incompatible species or varieties would often make a good union if the cuttings were approach grafted before planting, whereas side grafts usually failed. This indicates that food substances necessary for union may be supplied by the leafy shoot of the easily rooting component. Where a union could be established, shy rooting cuttings rooted equally well when side grafted as when approach grafted. This fact does not substantiate the theory that root-inducing substances pass across the graft union from the leafy shoot of the easily rooting component. It does suggest, however, that the shy rooting cutting is kept alive by the moisture supplied by the root system of the easily rooting component until it is able to mobilize the substances necessary for root formation itself.

2543. FLOOR, J., AND OTHERS.

Een bos enthoustjes. (A bunch of budwood.)
Meded. Inst. Vered. Tuinbouwgew. 43, 1953, pp. 76, illus.

This is a collection of 29 short articles on fruit and nuts reprinted from the 1950-52 numbers of *Boomkwekerij*. The subjects dealt with include pear, cherry, raspberry and walnut varieties, apple, plum and cherry rootstocks

and their propagation, and the propagation of nut was and hazel nuts.

2544. BRABEC, S.

Nová revoluční metoda pěstování pravokořenných ovocných stromů. (A revolutionary new method of raising fruit trees on their own roots.) [English and Russian summaries ½ p. each.]

Sborn. čsl. Akad. Zeměd., 1951, 24: 3-10, illus. [received Dec., 1952].

The method described is very reliable, and consists of two phases. First it is necessary to obtain "own roots", and then propagation with the aid of these is comparatively simple. On apple and some pear cuttings nurse roots can be grafted in March or April and removed after the cuttings have rooted. The tips of these self-rooted plants are cut back to encourage branching, thus providing cuttings for the following season which are root-grafted with their own roots. These grafted cuttings soon produce vigorous self-rooted trees, which can be used for the further production of similar trees. Cuttings of many stone fruit, walnut and pear varieties, however, will not unite with nurse roots, and to obtain self-rooted trees in such cases takes longer. One-year-old normally grafted plants are planted 10-15 cm. deeper than usual with the union below soil level, and are cut back to 5 cm. above the union. They will then produce etiolated shoots which, in some varieties, will strike root when ringed. With many varieties, however, nurse roots have to be grafted onto these etiolated shoots about 10-15 cm. above the point of branching. By the autumn the nurse roots have taken and the shoots are cut off, leaving 10-12 cm. scion wood below the union with the nurse graft; the nurse roots are cut back to 5-7 cm. and are planted deeply with the cut surface at least 15 cm. under the soil. Scion rooting takes place within 1 or 2 years; the nurse roots are then removed and further propagation with the aid of own roots continues as with the apples. The usual rootstocks are used for nurse roots. The methods used are shown in a series of illustrations. [They will, moreover, be found described in Baltej's *Grafting and Budding*, pp. 115-24, and Garner's *The Grafters Handbook*.]

2545. PLOCK, H.

I. Bewurzelungsversuche mit Apfelsteckhölzern. II. Bewurzelungsversuch mit Birnensteckhölzern. (Experiments on the rooting of apple and pear cuttings.)

Dtsch. Baumsch., 1953, 5: 45-6, illus.

Successful attempts to stimulate the rooting of apple and pear cuttings by treating them with a proprietary hormone preparation, "Wurzel-Fix", are described.

2546. DIKSHT, N. N.

Propagation of three varieties (Horti) of *Prunus* species by stem cuttings.
Curr. Sci., 1953, 22: 47-8, bibl. 6.

Dormant shoots of medium vigour, 9 in. long, of the difficult-to-root plum varieties Early Round, Howe and Kelsey were treated with indolebutyric acid at 10, 20 and 30 p.p.m. The highest concentration led to the best rooting, which was 66, 68 and 22% respectively in the 3 varieties. The subsequent development of the rooted cuttings was very satisfactory.—Fruit Research Station, Saharanpur, U.P., India.

2547. O'ROURKE, F. L., AND TUKEY, H. B.

Propagation of Malling apple rootstocks by
nurse-root grafting.*Proc. Amer. Soc. hort. Sci.*, 1952, 60:
101-3, bibl. 5, being *J. Art. Mich. agric.*
Exp. Stat. 1362.

In trials over 1 to 3 years of the nurse-root method, using young, vigorous scion wood of E.M. I, II, IV, VII, IX and XVI on seedling nurse roots, both the percentage survival and subsequent growth were satisfactory in view of rather poor soil conditions and lack of irrigation. Scion-rooting was variable in the autumn of the year of grafting, but at the end of the second season all clones were well scion-rooted. The method shows promise of speedier and more economical propagation, but it should be tested with more mature scion wood and under irrigation with the aim of increasing the percentage survival.

2548. GARNER, R. J.

Double-working pears at budding time.

A.R. East Malling Res. Stat. for 1952, 1953,
A36, pp. 174-5, illus.

The double-working of pears on quince [as described in *H.A.*, 14: 1502] can be accomplished at budding time by first inserting a budless shield of the intermediate variety followed by the normal bud shield of the upper scion. It is proposed to term the process "double-shield budding". The method is clearly illustrated.

2549. RIERA, F. J.

Los patrones clonales en fruticultura.
Catálogo provisional de fenotipos en
estudio. (Clonal fruit tree rootstocks. Pro-
visional catalogue of phenotypes under
investigation.)*An. Esc. Perit. agric. Barcelona*, 1952, 11:
73-86, bibl. 4, illus.

A classified inventory is given of numerous apple, pear, quince, plum, cherry, peach and almond rootstocks, clones of which are under investigation at Barcelona.

2550. HILKENBÄUMER, F.

Das Verhalten von Kernobst- und Pflaumen-
unterlagen unter verschiedenen Standort-
verhältnissen während der Zeit des Ertrags-
anstieges. (The behaviour of apple, pear and
plum rootstocks in different localities during
the period of yield increase.)Reprinted from *Z. Pflanzenz.*, 1953, 32:
79-106, bibl. 3, illus.

Following up his report on the effect of many rootstocks on the growth of young apple, pear and plum trees (see *H.A.*, 14: 496) the author now presents detailed records and illustrations of the same trees up to their 15th year from planting. Data are given on vigour, stem diameter, width and height of crown, and yield in several localities in central Germany. The actual rootstocks used were mainly those in the early Malling trials together with one or two seedling apple stocks such as Roter Trierer Weinapfel, the Pfänder quince, Hüttner 3 plum stock, etc. The author's results are set out in great detail. They concern vigour, yield per tree and per unit area. [They agree surprisingly with the early findings at East Malling with regard to apples and pears. Results with plum rootstocks are also similar except as regards Ackermann, which is classed

as of medium vigour and producing poor crops, whereas at East Malling it has been found dwarfing and worth retaining.]

2551. HOCKEY, K. C.

East Malling IX apple stock. Susceptibility to
woolly aphis.*N.Z. Gdnr.*, 1951, 7: 867-8.

Although E.M. IX is susceptible to woolly aphis, it does not render scion varieties budded on it more susceptible than do other stocks. As woolly aphis attack in New Zealand is restricted largely, if not entirely, to above-ground parts of the tree, the problem of control is primarily one for the nurseryman. Satisfactory control can be obtained by a combination of: (1) applying 2 spray applications a fortnight apart in early summer of γ -BHC at 4 oz./100 gal., (2) the liberation of a parasite, and (3) the control of weeds around stools and young stocks.

2552. TYDEMAN, H. M.

A description and classification of the Mal-
ling-Merton and Malling XXV apple root-
stocks.*A.R. East Malling Res. Stat. for 1952*, 1953,
A36, pp. 55-63, bibl. 6, illus.

Descriptions and illustrations are given of the fifteen Malling-Merton apple rootstocks and of Malling XXV. These rootstocks were bred at Merton and East Malling and are now being distributed for trial. Keys are provided for their identification in summer and winter, and for their separation from their parents and from other apple rootstocks of the older Malling series. [Author's summary.]

2553. GARNER, R. J.

The nursery behaviour of the Malling-Merton
and Malling XXV apple rootstocks.*A.R. East Malling Res. Stat. for 1952*, 1953,
A36, pp. 64-6, bibl. 4.

The behaviour of the Malling-Merton and Malling XXV apple rootstocks in the nursery is described and compared with older members of the Malling series. Large-scale production figures are given for the four Malling-Merton and Malling XXV rootstocks now available to propagators. [Author's summary.]

2554. PRESTON, A. P.

Five new apple rootstocks.

A.R. East Malling Res. Stat. for 1952, 1953,
A36, pp. 169-70.

A brief account is given of the performance of the Malling-Merton rootstocks MM. 104, 106, 109 and 111 and Malling XXV, which are being distributed for large-scale commercial propagation. Some cropping figures are given for Cox's Orange Pippin on these stocks and on 6 of the older Malling stocks in 2 trials established on a sandy soil and loam respectively. [See also *H.A.*, 23: 162.]

2555. CARLONE, R.

Caratteristiche botaniche e struttura delle
radici di piante di melo della varietà
"Firminello" nate da seme. (The botanical
and structural characters of the roots of
seedlings of the apple variety Firminello.)[English summary 7 lines.]
Ann. Sper. agrar., 1953, 7: 289-98, bibl. 3,
illus.

The botanical and structural characters are described of vigorous, medium and dwarfing rootstocks raised from seed of the apple variety Firminello. Root bark percentage and vigour were found to be correlated, the percentage being lowest in the vigorous and highest in the dwarfing stocks. Significant differences were also found to exist in the percentage area of fibre, parenchyma, vessels and rays of the roots.—Ist. Colt. arbor. Torino.

2556. FRIESDORF.

Baumschulversuche. (Nursery trials.)
Tätigk. Ber. gärtn. Versuchsanst. Friesdorf/
Bad Godesberg, 1951, 23: 89-98.

The root systems and nursery performance of many new apple seedling clones, raised from root cuttings for use as rootstocks, are evaluated.

2557. FRIEDRICH, G.

Untersuchungen über die Trieb- und Ertragsleistungen einiger Apfelsorten auf verschiedenen Malusunterlagen in Mitteldeutschland. (Rate of growth and yield of several apple varieties on different *Malus* rootstocks in central Germany.)

Reprinted from *Wiss. Z. Martin-Luther-Univ. Halle-Wittenberg*, 1952/53, 2: 339-61, bibl. 28, illus.

An experimental spindle bush orchard was planted in 1946 with the object of selecting the most suitable variety-rootstock combinations for apples under commercial conditions in central Germany, an area not naturally favourable for fruit growing. The trials showed again to what extent rate of growth and yield are influenced by the rootstock. The data, which are presented in detail, indicate that generally medium-vigorous, high-yielding varieties were best suited by E.M. IV, while E.M. I gave the best results in the case of less vigorous high-yielding varieties. Under the dry conditions of the area E.M. IX was of little value, except in combination with very vigorous or vigorous varieties. E.M. II and XI were also tested. High-yielding dessert varieties, such as Ontario, gave better financial returns than very high-class apples such as Cox's Orange and Gravenstein, whose moisture requirements are not fulfilled by the continental climate. The over-all conclusion from these large-scale trials is that the extension of commercial fruit growing to central Germany is economically justified. Small tree forms are recommended, as they suffer less from drought.

2558. BOLAS, B. D., AND RUCK, H. C.

Some effects of the addition of carbon dioxide to soil of pot cultures of Malling V apple rootstocks.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 99-103, bibl. 9, illus.

One-year-old M. V apple rootstocks were grown in compost in 10-in. pots. In half the pots from 15 May onwards CO₂ was passed into the soil at the rate of about 0.5 l. per min. for 3 minutes each morning and 3 minutes each evening. From measurements made up to the end of September it was shown that the treated plants were smaller, net assimilation was reduced, leaf area was less, the leaves had less water per gram of dry matter and the roots more, and the concentration of certain elements in the leaves was lower. The root/shoot

ratio was less, and changes in root structure were found. Mineral absorption per unit of root weight was increased. No indication of a direct toxic effect of CO₂ on root growth was found, the evidence suggesting that the main effect of additional soil CO₂ was to reduce the movement of materials within the plant. Determinations were also made of soil CO₂ concentrations and pH.

2559. TUKEY, R. B.

Performances of rootstocks.

65th A.R. *Purdue Univ. agric. Exp. Stat.*
1951/52, 1952, pp. 21-2.

At the Purdue University Agricultural Experimental Station, Lafayette, in a block of Golden Delicious top-worked on Virginia Crab intermediate rootstocks, only 10% of the trees could be considered normal after 8 years. The remainder were either dwarfed or completely crippled, and showed internal abnormalities. These symptoms suggest incompatibility between the stocks and the scion variety and might be used as a guide to the behaviour of other varieties on Virginia Crab intermediate stock. The varieties Gallia Beauty, Turley Winesap, Golden Delicious and Delicious on E.M. I, XIII, XVI and XII produced extraordinarily large yields. Their performance on E.M. I has been particularly impressive, with a production of almost 10 bushels per tree in the eleventh year from planting.

2560. SADAMORI, S., AND MURAKAMI, H.

Studies on root-stocks of apples. I. Effects of soil moisture on the growth of several *Malus* seedlings. [Japanese.]

J. hort. Ass. Japan, 1952, 21: 107-12, bibl. 23, illus.

In 1950 and 1951 the growth rate of seedlings planted in soils of different moisture content was investigated in *Malus sieboldii* Rehder, *Malus prunifolia* var. *ringo* Asami, *Malus baccata* var. *mandshurica* Schneider, and the Ralls apple (*Malus pumila* var. *domestica* Van. Es.). The seedlings were planted in shallow metal basins and the soil moisture in 14 basins was regulated every day to 15, 20, 30, 40, 50, 60, and 70% of dry weight of soil. The seedlings of all tested varieties except the Ralls apple made good growth in the soils of 40-60% (58-87% of field capacity) moisture, growing better as the soil moisture increased within this range. The growth of apple seedlings showed a slight decline in 60% soil moisture. In soils of less than 30% (44% of field capacity) moisture, varieties differed in their capacity for making good growth. *Malus prunifolia* var. *ringo* continued to grow (meagrely) with soil moisture of 20 to 30% though some of the seedlings died when it dropped to 15%. *Malus sieboldii* stopped growth in soil of less than 30% moisture, but none died even at 15% soil moisture, showing its drought-resistant character. *Malus baccata* var. *mandshurica* ceased to grow in soils of less than 30% moisture and many seedlings died at 15% soil moisture, thus showing inferior drought resistance to that of *Malus prunifolia* var. *ringo*. In soils of 70% moisture, although all varieties showed feeble growth, *Malus prunifolia* var. *ringo* showed the greatest tolerance of high moisture. *Malus sieboldii* stopped growth but did not die, and many seedlings of Ralls apple and *Malus baccata* var. *mandshurica* died, the latter showing the least resistance to wet conditions. Orchard response of these different species to drought may, however, be found to differ

greatly from that obtained under these highly artificial conditions. . . . Y.A.

2561. NELSON, S. H., AND PHILLIPS, W. R.
The effect of rootstocks on the storage quality of apples.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 2.

A progress report is given on the storage behaviour of McIntosh apples from trees grown on the rootstocks M. I, II, IX and XII, Anis, Antonovka and *M. baccata*. As in the previous season, fruit from trees on Anis had the longest storage life (140 days). The factors limiting storage life in each case are given.—Hort. Div., Ottawa.

2562. CANADA DEPARTMENT OF AGRICULTURE.
Influence of various rootstocks on the keeping quality of McIntosh apples.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 2.

Data are tabulated on the percentage red blush, rots and coreflush, the flavour, hardness and appearance of McIntosh apples stored at 32° F. from trees on the rootstocks E.M. I, II, XII, Anis and Beautiful Arcade. The best apples in respect of flavour, hardness and appearance were obtained from trees grown on Beautiful Arcade stock.

2563. THOMAS, L. A.
Stock and scion investigations. VII. A nursery trial with clonal pear rootstocks.
J. hort. Sci., 1953, 28: 121-4, bibl. 4.

A ten-year trial [at Stanthorpe, Qd] with Williams' Bon Chrétien pears on clonal pear rootstocks showed that the greatest scion growth, as measured by length of annual shoot growth and by girth of trunk, occurred with rootstocks *Pyrus calleryana* and East Malling No. D3. Largest total crops were borne on East Malling No. D3. Other rootstocks under trial were East Malling Nos. B1, C2, C7 and D4. Rootstock B1 suckers badly, D4 is difficult to transplant, C2 appears susceptible to crown gall and C7 produced small trees which suffered frost damage. [Author's summary.]—C.S.I.R.O. Queensland.

2564. SØRENSEN, A.
Forsøg med forskellige grundstammer til pærer 1935-49. (Pear rootstock trials 1935-49.) [English summary 1½ p.]
Tidsskr. Planteavl, 1953, 56: 272-85, bibl. 17, being *Beret. Stat. Forsøgvirks. Plantekult. 465*.

The paper is based on the first fifteen years' records of a pear rootstock trial, carried out at Blangstedgaard with the varieties Beurré Hardy, Conference, Doyenné du Comice and Bartlett on Malling rootstocks quince A and C and the free pear clones B and D. Some pear seedlings from a Danish nursery were also used. Data are presented on weight of filler trees, rate of annual growth, tree height and diameter of the top, leaf characters, fruit yields and fruit size. The results show that the vigorous varieties Hardy and Comice were best suited by quince A, though trees on quince C cropped better in the early years. Conference and Bartlett, on the other hand, gave highest yields on the two free pear stocks. In the case of the two latter varieties the crops on quince C were markedly lower

than those from all other rootstocks. With all varieties trees on quince A produced the largest fruits.

2565. KELLI, A. Č.
Dwarfing rootstocks for pears. [Russian.]
Sad i Ogorod, 1952, No. 2, pp. 26-8, illus.

Preliminary experiments suggest that *Cotoneaster lucida*, *melanocarpa* and *tomentosa* and *Chaenomeles japonica* (Japanese quince) may serve as winter-resistant dwarfing rootstocks for pears.

2566. MARTÍNEZ-ZAPORTA, F.
Una contribución al empleo de los métodos estadísticos en fruticultura. (A contribution to the use of statistical methods in fruit growing.) [French summary 2½ pp.]
Bol. Inst. Invest. agron. Madrid, 1952, 12: 397-527, bibl. 29.

The experiments reported here were carried out with pears over a period of 8 years, nursery trees on the clonal East Malling rootstocks quince A, common B and C being used. (1) In a uniformity trial with the variety Mosqueruela Encarnada on these 3 rootstocks, the coefficient of variation decreased (with one exception) as the number of trees per plot increased, but to an extent that was hardly significant. It is considered that a sufficient degree of accuracy can be obtained with plots of 4-5 trees. (2) In another experiment with the same variety and rootstocks, it was found that there was a close correlation between increase in girth and height at the end of the first season of growth. The coefficient obtained varied in different years and was probably related to the system of pruning. It is concluded that girth can be used as a good measure of wood production. Severe cutting back throughout the first season of growth had no effect on trunk diameter. (3) The regression of mean trunk diameter in relation to time, during the first 3 years of each experiment made, varied for the same year and variety with different rootstocks. It also varied for the same stock/scion combination with different plantations. Examination of the coefficients of regression showed that uncontrollable factors exert a greater influence than the rootstock itself on the rate of annual girth increase of the scion during the first 3 years of growth. (4) The degree to which the scion modifies the capacity of the stock to increase trunk diameter is demonstrated in a series of several experiments.

2567. KÜPPERS, H., AND FRIEDRICH, G.
Auslese von Pflaumenformen der Gattung *Prunus domestica* (L.) für die Samengewinnung und Anzucht von Pflaumen-Veredelungsunterlagen. (The selection of strains from the genus *Prunus domestica* as sources of seed for raising plum rootstocks.)
Züchter, 1953, 23: 127-34, bibl. 3, illus.

In view of the impossibility of satisfying the present demand for plum rootstocks in Germany by vegetative propagation of clonal stocks, a wide search was made for possible sources of seed, the chief requirement being a combination of uniformity in *F*₁ with good performance of the seedlings. Certain selections made by the nursery Hüttner, designated as P. Hüttner 35/V/8, etc., proved very satisfactory in the nursery when worked with 3 varieties, while other seedlings of the same source were left unworked for morphological

and physiological investigations. The behaviour of the selected rootstocks in the orchard remains to be studied. The work described has been carried out jointly by the nursery Hüttner and the Inst. f. Obst- u. Gemüsebau, Martin-Luther Univ., Halle/Wittenberg.

2568. FRIESDORF.

Über den Einfluss der Unterlagen auf den Ertrag bei Pfirsichen. (The influence of rootstock on yield in peach.)

Tätigk Ber. gärtn. Versuchsanst. Friesdorf/ Bad Godesberg, 1951, 23: 85.

The tabulated records of 12 years' crops show that Croosies Yellow, Marunke and St. Julien "Ausläufer Böhm" induced higher yields in peach varieties than 3 other St. Julien rootstocks and Mussel Plum, the differences ranging from 10 to 43%.

2569. CURTIS, O. F., Jr., AND RODNEY, D. R.

Ethylene injury to nursery trees in cold storage.

Proc. Amer. Soc. hort. Sci., 1952, 60: 104-8, bibl. 4, illus., being *J. Pap. N.Y. St. agric. Exp. Stat.* 893.

Traces of ethylene, in the order of 1 p.p.m. in the atmosphere of the storage room, can do serious damage to dormant nursery stock of apple and especially of pear, producing characteristic lesions, abscission or death of buds and death of stems. At 35° F. exposure for about 2 months is required for development of symptoms on pears. Differences in ethylene concentration between 1 p.p.m. and 10 p.p.m. do not greatly alter the required exposure period. Temperature has a great effect. As compared with slow development at 35° F., lesions develop about 4 times as fast at 45° F. and 7 times as fast at 55° F. [From authors' summary.]

Growth phenomena.

2570. BORGMAN, H. H.

Bepaling van de groei van vruchtbomen. (Determination of the growth rate of fruit trees.) [English summary ½ p.]

Meded. Dir. Tuinb., 1953, 16: 239-42, illus.

The problems involved in measuring the growth rate of trees in manurial experiments are discussed. The usual methods of measuring either girth of stem or height and width of crown both have disadvantages. A method is suggested of using photographs of a definite scale for comparing tree size. A diagram shows the relationship between stem girth and size of tree determined by photographs. The relationship is fairly close but deviation can be caused by severity of pruning. It is concluded that the growth of a tree can best be represented by a figure which is the arithmetical average of the girth of the stem and the length of the branches.

2571. SLOVIĆ, D.

An aid to the estimation of longevity in fruit trees. [Serbian, with English summary ½ p.]

Annu. Fac. Agron. Sylvic. Skopje, 1949/50, 1951, 3: 175-99, bibl. 9 [received 1953].

Experiments with fruit trees, including *Prunus*, *Amygdalus* and *Pyrus* spp., *Juglans regia* and *Castanea vesca*, showed that the longevity of a tree is closely correlated with the ratio of development of root and shoot in the

first year of growth. It was found that the length increment of roots in the first year of growth divided by the corresponding length increment of stems, produced a coefficient of longevity D, and that $D \times 50$ equalled the approximate number of years which the trees may be expected to live.

2572. DERMEN, H.

Periclinal cytochimeras and origin of tissues in stem and leaf of peach.

Amer. J. Bot., 1953, 40: 154-68, bibl. 14, illus.

Origin of tissues in stem and leaf of peach was determined from a study of cytochimeral types of plants. A technique is outlined for the preparation of sections, particularly for photomicrography as well as for the histogenetic study of the chimeral materials. Cytochimeral types were determined from the longitudinal sections of dome region in the shoot apex where cells are arranged in layers. It is pointed out that a histological type of chlorophyll variegation should never occur in peach. If a colour change ever occurred in peach leaf, it should be homogeneous throughout the leaf blade. In the basal portion of the petiole there were in some cases differences in ploidy in different parts of vascular tissue. This indicates that there is no specific relationship between the vascular tissue and any particular histogenic layer, and that vascular tissue differentiation in the leaf must follow after leaf primordia have reached a certain degree of growth. [From author's summary.]—Bur. Plant Indust., U.S.D.A., Beltsville, Md.

2573. MARKS, G. E.

Genetical studies in pears. VI. Giant bud sports.

J. hort. Sci., 1953, 28: 141-4, bibl. 7, illus.

The polyploid chimerical nature of two giant sports in pears, namely Improved Fertility and Double Williams', is described. Both are shown to have a diploid epidermis. Tetraploid sports and diploid counterparts show no differences in stomatal size. The lower stomatal frequency in Double Williams' is attributed to a "stretching" of the epidermis due to the greater bulk of mesophyll in the leaf of the tetraploid. There is a greater uniformity in stomatal frequency from leaf to leaf within the tetraploids, a fact which indicates physiological stability greater than in the diploids. It is suggested that all somatic sports in fruit are most probably periclinal chimeras. [Author's summary.]—John Innes hort. Instn, Bayfordbury.

2574. KEMMER, E.

Über das primäre und das fertile Stadium bei Apfelgehölzen. (On the primary and fertile phase in apple trees.)

Züchter, 1953, 23: 122-7, bibl. 11, illus.

In the author's view the protagonists of the "juvenile" form in apples, Fritzsche [H.A., 18: 1626] and Pas- secker [H.A., 14: 1505; 18: 1625; 22: 3423], have an easy case, because the normal behaviour of seedlings and varieties is neatly accounted for by their theory. Opponents, on the other hand, have the onus of producing circumstantial evidence to show that seedlings do not necessarily remain sterile for a definite period or that the "mature" form is irreversibly fixed. It is Kemmer's contention that fertility could generally

be induced earlier if we had more knowledge of how to influence a young tree's development. Here are some further observations [see also *H.A.*, 18: 868; 20: 2348; 21: 3274; 23: 1533] to disprove the validity of Fritzsche's and Passecker's theory of rigid developmental phases: Of 1,029 seedling pairs (seedling (a) on its own roots and (b) worked on E.M. IX) 212 pairs had not flowered at the time of writing. For the remaining 817 pairs the mean duration of the period from germination to first differentiation of flower buds was 9 years in the case of seedlings on their own roots and 7 years in the case of worked trees. The sterile period was also shortened by: (1) Ringing (width 5 cm.); (2) Light soil or restriction of the soil volume in potted trees; up to the 10th year about 4 times as many seedlings had flowered on the light-soil-plots as on heavier soil; (3) Grafting scions from 1-year-old seedlings on fertile trees (E.M. IX and Belle de Boskoop). The instability of leaf characters, flowering in the juvenile zone and the rooting capacity of varieties have been discussed in earlier articles, hence a reference to new illustrations of these phenomena in the present paper may suffice. The argument that clonal rootstocks have retained the "juvenile" characteristic of rooting readily, because permanent stooling has kept them in the "juvenile" phase, is countered by the following experiment: Some "mature" bushes of E.M. IX were cut back severely (within the fruiting zone) and others were earthed up to the fruiting zone in the top. Fruiting branches of E.M. II and IV were also earthed up. All treated parts formed roots during the first summer in a manner similar to that in the stool bed, viz. E.M. IV abundantly, E.M. IX well and E.M. II moderately. Moreover, the rejuvenated E.M. IX plants were found to produce the same "wild" leaves as occur on stool bed plants. Kemmer concludes that the terms "juvenile" and "mature", coined for different dendrological purposes, are not applicable to apple.—Inst. f. Obstbau, Techn. Univ. Berlin/Charlottenburg.

2575. WELLENSIEK, S. J.

Rejuvenation of woody plants by formation of sphaeroblasts.

Reprinted from *Proc. kon. ned. Akad. Wetensch. Ser. C*, 1952, 55: 567-73, bibl. 10, illus., being *Publ. Lab. TuinbPlantent. Wageningen* 109.

Sphaeroblasts are roundish, woody bodies arising either adventitiously or from dormant buds in the bark of a variety of tree species. Dermen [see *H.A.*, 19: 848] induced sphaeroblasts artificially on apple grafts by cutting the trees back to 1 ft. and removing all the buds. In 1950 a series of experiments was set up with 5 apple and 5 pear varieties to test Dermen's results and to investigate further the factors which govern sphaeroblast formation. Out of 80 trees submitted to this treatment, 71 produced a total of 99 sphaeroblasts. The varieties differed considerably in their response to the treatment, Conference and Goudreinette producing the most sphaeroblasts. Two-year-old grafts produced more than 1-year-old, and trees grown in a greenhouse more than trees grown outside. Of all the sphaeroblasts produced, 40% developed shoots from adventitious buds. Some of these shoots rooted as well as shoots from 1-year-old seedlings, but their rooting capacity has not been quantitatively determined. Their

capacity for root formation appeared to be fixed by stooling. Shoots produced from stooled cuttings had morphologically juvenile characters, although the adventitious shoots on the sphaeroblasts had not. A preliminary hypothesis is offered to explain why these juvenile characters did not arise earlier. The results obtained suggest that an adult plant can be brought into the juvenile phase by the production of sphaeroblasts.

2576. TILL, M. R.

Apple root depth and distribution.

J. Dep. Agric. S. Aust., 1953, 56: 272-4, illus.

As part of an investigation into the water requirements of apple trees a study of root distribution was undertaken at Blackwood Experimental Orchard, South Australia. Two 42-year-old Cleopatra trees on Northern Spy growing on soil derived from shale were investigated. Many roots, chiefly feeding roots, occurred in the brown loamy top soil (0-8 in.). The majority occurred in the red clay subsoil (8-30 in.); in the upper part there were many secondary branch roots and in the lower part the main scaffold roots. Few roots existed in the underlying lime horizon (30-60/84 in.), but some penetrated to a depth of 13 feet or more in faults in the parent rock. 74% of the roots found in the top 11 feet of the soil occurred in the top 30 in.

2577. LIWERANT, J.

Détermination des époques de débourrement et de floraison des arbres fruitiers. (Determination of dates of bud burst and flowering of fruit trees.)

Ann. agron. Sér. A, 1952, 3: 530-1.

Experiments at Toulouse showed that the water content of the buds is an accurate index of bud burst and flowering. During dormancy the water content of the flower buds remains at 50-55%. Bud burst is associated with a considerable increase in water content which occurs at different dates for different species. After bud burst the water content continues to rise and reaches 82-86% at flowering.

2578. BROWN, D. S.

Climate in relation to deciduous fruit production in California. V. The use of temperature records to predict the time of harvest of apricots.

Proc. Amer. Soc. hort. Sci., 1952, 60: 197-203, bibl. 3.

Comparisons were made of different methods of using temperature data to predict the time from full bloom to harvest of Royal (Blenheim) apricots. Estimates based on the number of hours in the temperature classes 40 and below, 41-45, 46-50, 51-60, 61-70, 71-80, 81-90, and 91-100 degrees F., for the 42 days after full bloom were the most precise. Estimates based on the average of the daily mean temperatures for six weeks after full bloom were also highly satisfactory. This latter method has the advantage of not requiring the continuous thermograph records needed in the other method. Both these methods were more accurate than estimates based on maximum or minimum temperatures or on heat units. [From author's summary.]

2579. SINGH, T. R. S.

Studies on biennial bearing of apples. Part I.

Agriculture Anim. Husb., 1950, 6 (Sect. II, Hort.): 1-4 [received 1953].

The results (but not the experimental data) are given of a study conducted (at an unspecified place) of tree vigour in relation to biennial bearing in apples. It is concluded that biennial bearing arises from the failure of bourse buds produced below the fruiting clusters to differentiate into flower buds the following spring, apparently owing to lack of sufficient leaf surface on the spurs during the critical period of fruit bud formation. Local conditions in each spur can, however, provide limiting factors permitting or inhibiting the differentiation of bourse buds into fruit buds, and these conditions can be regulated by special treatment which will be discussed in a later article.

2580. CROWDY, S. H.

Observations on the effect of growth-stimulating compounds on the healing of wounds on apple trees.

Ann. appl. Biol., 1953, 40: 197-207, bibl. 8.

Wounds were made at various times of the year on the trunks and large branches of apple trees with a 1-in. bit and treated with a number of organic compounds in lanoline paste. The healing of these wounds was followed through two growing seasons by tracing and measuring the area of exposed wood at different times after wounding. Callus growth was practically confined to the summer months. Development of callus was improved by applications of lanoline, and the lanoline effect could be further enhanced in the early part of the first growing season following treatment by the addition of certain growth-stimulating compounds including 4-chloro-3,5-dimethylphenoxyacetic acid and 2,4-dichlorophenoxyacetic acid. Indolyl-3-butyric acid probably also caused some stimulation. After the period of initial stimulation the rate of callusing was approximately the same on treated as on untreated wounds.

2581. TUKEY, L. D.

Effect of night temperature on growth of the fruit of the sour cherry.

Bot. Gaz., 1952, 114: 155-65, bibl. 22, illus.

Fruiting limbs of sour cherry trees, variety Montmorency, were confined at night in heated chambers from the end of full bloom till fruit maturity. Six night temperature treatments were given, averaging respectively 56.4°, 59.4°, 65.1°, 72.6°, 80.8° and 87.7° F. The effects of night temperature on the duration of the 3 typical stages of development were observed, stage I extending from full bloom to the hardening of the stony pericarp, stage II to the period of rapid development of the pericarp, and stage III to fruit maturity. The duration of stages I and II was decreased, while that of stage III was increased by an increase in night temperature. The total number of days from full bloom to maturity decreased slightly as the night temperature increased to 80.8° F., but at the highest temperature of 87.7° F. the period from full bloom to maturity was relatively long. The effects of temperature on the development of the fleshy pericarp, the stony pericarp, the nucellus and integuments and the embryo are also recorded. Low total soluble solids, poor fruit colour and poor foliage colour were produced with high night temperatures during stage III. The results indicate that

warm night temperatures during stages I and II and cool night temperatures during stage III are optimal for the production of sour cherries.—Pa St. Coll.

2582. RUDLOFF, C. F., AND SCHMIDT, M.

Untersuchungen über Kernzahl und Fruchtwicht und deren gegenseitige Beziehungen bei einigen Apfelsorten. (Investigations on the relationship between number of seeds and weight of fruit in certain apple varieties.)

Züchter, 1953, 23: 44-61, bibl. 14.

From pre-war data on many apple varieties harvested in several localities in several seasons it is concluded that: (1) The approximate number of seeds formed appears to be characteristic of a variety, at least in diploid apples. Some varieties are more stable than others in this respect. The proportion of infertile seeds seems to be governed by similar laws. (2) A slight positive relationship is found to exist between number of seeds and weight of fruit, in the sense that with apples from the same tree mean fruit weight increases with number of seeds. However, in most cases the correlation coefficient was statistically not significant and there were also some cases of a negative correlation. The failure to produce equivocal figures is attributed to the fact that the apples examined did not constitute a sample of the total crop of a tree, but were obtained from stores, in which the undersized fruits had been removed in the grading process—an error to be avoided in future studies. The influence of the pollinator on the relation between number of seed and weight of fruit is among other subjects discussed. Parallel records on the relationship between number of seeds and fruit weight were unfortunately lost.

Pollination.

(See also 2460, 2461, 2541, 2985.)

2583. BREVIGLIERI, N.

Studi e ricerche sulla biologia florale e di fruttificazione del melo nel Ferrarese. (Studies and investigations on the flower and fruit biology of the apple in the province of Ferrara.) [English and German summaries 1½ and 2 pp. respectively.]

Reprinted from *Ann. Sper. agrar.*, 1953, Vol. 7, pp. 265, bibl. 1159, illus.

The author is to be congratulated on what must surely have been one of the most exhaustive—not to say exhausting—studies of apple flower and fruit biology published.

Those who read it will be able to benefit, not only from a study of the work of other authorities, but also from the clearly described observations of the author and his fellow workers in the orchard and from the quite remarkable micro-photographs which, among others, embellish the text.

The period covered by the observations was 1948 to 1951.

The biological cycle of the apple is studied from the organogenesis of the flower to the maturation of the micro- and macrogametophyte, up to the development of the embryo and of the fruit.

Among factors influencing the chemico-histological development of the buds the author describes the effects of total defoliation, of removal of half the leaves, of removal of half of each of the leaves, of removal of

leaves but not leaf stalks, of removal of 33% of the leaves. Bud differentiation was much reduced as a result of such treatments and effects were seen even in adjacent untreated branches. Abnormalities in pollen and ovules were also noticed. The overwhelming importance of bees and their proper treatment is illustrated and stressed. Methods of artificial pollination are also described. Sterility due to incompatibility is considered at some length. In dealing with sterility due to environmental factors of nutrition and temperature the author gives his own observations on late frost damage to blossoms. He makes deductions on apogamy and parthenocarpy. He gives many details of his work in the years 1948-51, noting relative flowering times and the characteristics of the pollen and pollen tube in 32 varieties 3, 6 and 20 hours after collection. He finds that only in very early and very late varieties is there danger of insufficient flowering overlap occurring. His isolating apparatus, cages, linen, gauze, cellophane and parchment bags are described and discussed. The characteristics of pistils and stamens of 32 varieties are noted and lists are given of varieties found compatible or incompatible in the investigations, which covered fruits and seeds and the problem of metaxenia. The author's experience shows that artificial cross-pollination gives better results than self-pollination even in self-fertile varieties and rather better results than free cross-pollination. A list is given of good and bad pollinators and suggestions are made for insuring adequate pollination.

D.A.

2584. CARLONE, R.

Effetto della riduzione degli stili funzionanti sulla fecondazione de alcune varietà di melo e di pero. (Effect of reducing the number of styles on the fertility of some varieties of apple and pear.) [English summary 13 lines.]

Reprinted from *Genet. agrar.*, 1952, 3: 193-203, bibl. 5.

Experiments were conducted at the Piedmont Fruit-growing Observatory at Turin in 1951 to determine the effect of reducing the number of styles on the fertility of apples and pears. Three varieties of each were employed: Rambour Franc (diploid), Gravenstein (triploid), Bismark (pollinator); and Passe Crassane (diploid), Butirra Diel (triploid), Butirra Claireau (pollinator). Of each variety there were 6 lots of 200-400 flowers, the lots having 5 or more styles, 4, 3, 2, 1, and no style respectively. Fruit set was greatly influenced by the number of styles present. In every variety, especially the triploids, the percentage fruit set was lowest in flowers with one style, increased as the number of styles increased, and was highest in flowers with the full complement of styles. In every case a reduction in the number of styles resulted in a lower average number of seed and a lower average weight of individual fruits. The number of empty locules was greater in pear than apple, and in triploids than diploids, and increased with reduction in the number of styles.

2585. MANARESI, A.

Ricerche sull' impollinazione del melo col metodo "spur-unit". (Research on apple pollination by the spur-unit method.) [English summary ½ p.]

Riv. Fruttic., 1953, 15: 77-105, bibl. 30, illus.

Apple pollination studies were conducted over a period of 5 years to determine the best pollinators for the chief Italian commercial varieties. The usual and the spur-unit methods of pollination were employed. The latter consists of pollinating with pollen from 4 different varieties the 4 flowers left on a spur. It was established that (1) some varieties, especially Annurca, Cleopatra and Rambour rosso d'inverno, show a slight and somewhat variable parthenocarpic tendency; (2) all are self-incompatible except Cleopatra, Durello and Gresswell; (3) 2 pollinations at an interval of 1-2 days increased fruit set by 14% compared with a single pollination; (4) the spur-unit method gave constant results and is to be recommended; (5) triploid varieties are poor pollinators of one another. A list is given of the best pollinators for 16 commercial varieties.

2586. FABER, H.

Die Bedeutung solitärer Apiden und Fliegen für die Bestäubung der Obstbäume nach Untersuchungen im Alten Land. I. 1951 und II. 1952. (The significance of solitary bees and flies for the pollination of fruit trees as shown by investigations in the Altenland. I. 1951 and II. 1952.)

Mitt. Obstb. Versuchslands Jork, 1953, 8: 29-39, bibl. 22, and 39-40.

Species observed to effect pollen transmission during each year are listed.

2587. GRIGGS, W. H., VANSELL, G. H., AND IWAKIRI, B. T.

The use of beehive pollen dispensers in the pollination of almonds and sweet cherries.

Proc. Amer. Soc. hort. Sci., 1952, 60: 146-50, bibl. 5.

The principle of the pollen dispenser is that bees are forced to walk through a supply of suitable pollen as they leave the hives. In the tests described here in which hives with pollen-distributing units were placed in cages containing almond and sweet cherry trees very few fruits were set. Possible reasons for the failure are discussed.

2588. JONES, G. D. G.

The honey-bee and agricultural chemicals.

New Biol., 1953, No. 14, pp. 104-10, bibl. 6.

A review is given of work on the dangers of chemical sprays to bees and on ways of overcoming these dangers, such as using less toxic sprays or carriers less damaging to the bees' cuticles, and incorporating repellents.

Soil management, fertilizers and irrigation.

(See also 2424, 2425, 2672s.)

2589. EAVES, C. A.

Minor elements in relation to storage quality.

Keeping quality of McIntosh and Spy apples from commercial orchards in the Annapolis Valley.

Influence of cultural treatment upon the keeping quality of Wagener and Golden Russet apples.

Influence of nutritional treatment upon the keeping quality of Cortland apples stored at 34° F. and on the mineral content of the trees.

Applications of unbalanced fertilizers to Red Spy apple trees in relation to keeping quality.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Ctte 1951, pp. 10.

These brief reports from the Experimental Station, Kentville, N.S., consist mainly of tabulated data showing the effect of minor element sprays, soil management practices or fertilizer applications on the storage qualities of apples.

2590. CHINO, T., ŌNO, T., AND SUGIMURA, J. Soil management in sloping orchards. [Japanese, with English summary ½ p.] *J. hort. Ass. Japan*, 1953, 21: 193-201, bibl. 11.

Surface run-off, soil erosion, soil temperature, soil moisture and the growth of peach seedlings were compared in 1951 under straw mulch, sod culture, winter cover crop (with grass mulch during the peach growing season), summer cover crop and clean cultivation in an orchard with a clayey soil and a 28% slope. Run-off was at the same rate with mulch, sod culture and winter cover, but was less with summer cover. Erosion was not directly related to run-off but varied with listed factors: it varied little with soil management method. Growth in length of peach shoots and total fresh weight of top and root were all greatest under mulch, followed by winter cover, clean cultivation, summer cover and sod culture. In all systems the roots penetrated more than 60 cm. and were most abundant between 5 and 10 cm.; the depth of the greatest concentration of fine roots varied between systems. Even at 30 cm. differences in soil temperature due to soil management system were noticeable. Under mulch, sod culture and winter cover the temperature was too low in May/June, and in July/August it was too high under clean cultivation and winter cover. From September onward it fell under mulch, summer cover and sod culture. The effect of management on soil moisture was also evident at 30 cm. Soil moisture conditions at all depths were best with mulch, followed by winter cover. Moisture was somewhat inadequate at 0-20 cm. under clean cultivation and much more so even at 20-30 cm. under sod culture and summer cover.

2591. MORITA, Y., ITAKURA, T., AND IWATA, M. Studies on physical properties of soils in relation to fruit tree growth. I. Survey of orchard soils. (4) Root development response to cultural treatment of peach seedlings. [Japanese, with English summary ½ p.] *J. hort. Ass. Japan*, 1952, 21: 129-45, bibl. 27.

The soil properties, top growth and root distribution of peach seedlings were compared at Hiratsuka on triplicated plots under clean cultivation, straw mulch and cover crop with and without fertilizer in 1950 and without fertilizer on better subsoil in 1951. Root development was optimum at 24° C. and ceased at 35° C. The optimum soil moisture was 20-40% and top growth ceased at about 10%. Temperature and moisture. Straw mulch maintained soil temperature near the

optimum. Soil moisture was lowest in the surface soil under clean cultivation, and at 5-10 cm. under cover crop (under 10%). Root development. Root development was best at 0-5 cm. under mulch, and at 5-20 cm. under mulch plus fertilizer, followed by clean cultivation plus fertilizer. Below 30 cm. soil temperature and moisture and root development were similar under all treatments. Nutrients. Leaf and top soil K were significantly increased by mulching. Fertilizer did not increase soil P. Leaf N was lowest under cover crop. Organic matter content under the various treatments differed only in the top soil, it was highest under straw mulch and lowest under clean cultivation.

2592. MORITA, S., AND AOKI, A.

Studies of the soils of apple orchards in Japan. III. On the properties of soils under grass sod.

J. hort. Ass. Japan, 1952, 21: 146-8, bibl. 5.

The properties of apple orchard soils under clover sod and clean cultivation (the normal practice in Japan) were compared at the Aomori Apple Experiment Station and full analytical data are presented. Humus content and base exchange capacity were little higher in the sod plots. pH was lower in the sod plot but there was no significant difference between N, available P and K in the two. Microbial action, especially nitrification, and the degree of aggregation were higher in the sod plots.—Faculty of Agric., Saikyo Univ., Kyoto.

2593. SHIBUKAWA, J., AND OTHERS.

Studies on apple sod culture. II. Survey of apple orchards under sod. [Japanese, with English summary.]

J. hort. Ass. Japan, 1953, 21: 225-35, bibl. 11, illus.

Surveys of red clover sod apple orchards in Aomori Prefecture were conducted in 1949-52. It was found that the sod was growing very vigorously. The average yield exceeded 14½ tons green matter per acre; it was highest in the second season and fell off in the third. Owing to differences in soil properties orchards fell into two soil moisture content classes; in one, content was much the same in sod and cultivated plots, and in the other it was much lower in the sod plot during the dry season. The sod did not compete unduly with the trees for moisture, if mown frequently and left as mulch round the trees. No very definite effects of sod culture upon tree vigour, yield and fruit quality were observed, but in dry areas sod culture trees showed reduced vigour in the dry season (especially May-June), and fruit colour in sod culture trees was generally superior to that in cultivated trees. 90% of the red clover roots were located in the top 30 cm. of the soil but some extended to a depth of 90 cm.

2594. PROEBSTING, E. L.

Some effects of long continued cover-cropping in a California orchard.

Proc. Amer. Soc. hort. Sci., 1952, 60: 87-90, bibl. 5.

After 25 years' trial in an irrigated orchard at Davis, California, annual cover-cropping with a summer legume, a winter legume and a winter non-legume (rye) have not increased organic matter, total N, or moisture-holding capacity of the soil as compared with clean cultivation. Alfalfa sod has increased total N but not

moisture-holding capacity. However, cover-cropping has improved soil structure in all cases and with it water penetration. As an example of tree performance the apricot is selected from among the various species in the trial. No differences in growth or yield attributable to treatments have occurred. [For an earlier report see *H.A.*, 8: 698.]

2595. TILL, M. R.

Cover crops for Barossa Valley orchards and vineyards.

J. Dep. Agric. S. Aust., 1953, 56: 268-71.

Trials with cover crops for orchards and vineyards in the Barossa Valley, South Australia, were conducted at the Nuriootpa Viticultural Station in 1948-52. The crops recommended are either a cereal (rye, oats or barley) or peas at $1\frac{1}{2}$ bushels per acre; or a mixture of rye and peas, or of oats and peas at 1 bushel cereal and $\frac{1}{2}$ bushel peas per acre. Fertilizer requirements are indicated. The crops should be sown in April and turned under in August.

2596. GOODMAN, R. N.

The influence of organic mulches on some chemical and physical characteristics of an orchard soil.

From abstr. in *Dissert. Abstr.*, 1952, 12: 774.

The effects of mulching as an orchard management practice in a block of Jonathan apple trees was compared with the conventional bluegrass sod system of culture. The mulched trees received annual applications of 200 lb. of either hay or straw during an 8-year period. Mulching increased the organic matter, total nitrogen, and total exchange capacity of the orchard soil. The hay mulch depressed the pH of the soil and a corresponding decrease in the exchangeable calcium occurred under this treatment. The straw mulch increased the exchangeable calcium of the soil in most instances to a depth of 12 inches. Similar increases were observed under both the hay and straw mulches as regards available phosphorus and exchangeable potassium. Root production was significantly increased in the surface 12 inches of the soil under the mulch and large numbers of fine feeder roots permeated the lower decomposed portion of the mulch itself. The available water supply of the sodded soil twice approached the permanent wilting point during the growing season. This condition was not apparent where the mulches had been applied. However, once the soil water supply was removed from under all treatments, it was replenished at a more rapid rate under the mulches when precipitation occurred.

2597. ANDRÉ, A.

Le diagnostic foliaire, critère de jugement de l'alimentation des poiriers et pommières. (Foliar diagnosis, a method of determining the nutritional status of pears and apples.)

Rev. hort. Paris, 1953, 125: 842-7, bibl. 5, illus.

Sampling experiments showed that significant results can be obtained by the foliar diagnosis method if leaf samples are taken from a fruiting shoot and vegetative shoot at the 3 physiological periods, fruit set, June drop, and fruit maturity.

2598. LJONES, B.

Kjemiske analysar til rettleieing om gjødsling i frukthagen. II. Blad-analysar. (Chemical analysis as a guide to manuring in fruit trees. II. Leaf analyses.)

Frukt og Baer, 1953, 6: 26-40, bibl. 21, illus., being *Meld. Inst. Fruktdyrk. Fruktkons. norg. LandbrHøgsk.* 25.

Analysis figures of apple leaves from several varieties, grown in four localities in Norway, are tabulated for N, P, K, Ca, Mg in conjunction with soil analytical data for K and P. It appears that no clear relationship between soil and leaf analysis can be expected, unless any of the nutrients is present in deficient or excessive amounts. At Ulvik, for instance, available soil P content was lower than at Njøs and Ås, but leaf P content was higher. Excessive K manuring may cause Mg deficiency symptoms. [For an abstract of Part I of this paper see *H.A.*, 22: 2184.]

2599. FRANÇOT, O., AND BADOUR, C.

Le diagnostic foliaire en Champagne. (Foliar diagnosis in Champagne.)

Potasse, 1953, 27: 3-7, from abstr. in *Soils and Ferts*, 1953, 16, No. 784.

Results are given for N, P and K determinations in vine leaves at different stages of the growing season. The soils were mainly calcareous clays overlying chalk. In general K nutrition was better on plots with highly calcareous subsoil, but indications of K deficiency were present on most plots. Leaf P and to some extent leaf N were lower on the more calcareous plots. A case of crop failure was traced to N excess coupled with K deficiency.

2600. GACHON, L., AND COLLIER, D.

Contribution à l'étude du diagnostic foliaire du pommier. (A contribution to the study of foliar diagnosis in the apple.)

Ann. agron. Sér. A, 1952, 3: 523-4, bibl. 1.

In continuation of previous experiments at Clermont-Ferrand on foliar diagnosis 16 apple trees were studied in a grass-orchard at Cébazat in 1951. Five categories of trees were employed, viz. healthy young and healthy old trees, unhealthy trees treated with N, unhealthy untreated trees, and unhealthy trees believed cured by heavy N applications in 1947-49. Material was taken from the trees 3 times: flowers in late April, and leaves from the same position on the trees at fruit set in late May, and just before harvest in early October. At blossom time the N, P, K, Ca, Mg levels were more or less identical in all the trees and at fruit set the differences were small. The results at harvest were, however, significant and confirmed those of 1950, viz. (1) in unhealthy trees, whether treated or not, N tended to be high while P and K were distinctly lower; (2) the low K in apparently cured, but unhealthy trees was striking; (3) old trees contained much less P and K than young.

2601. SMITH, C. B., AND TAYLOR, G. A.

Tentative optimum leaf concentrations of several elements for Elberta peach and Stayman apple in Pennsylvania orchards.

Proc. Amer. Soc. hort. Sci., 1952, 60: 33-41, bibl. 17, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1730.

A survey was made during each of 2 seasons in 9 peach and 9 apple orchards of a satisfactory commercial standard to determine whether the "optimum value" concept could be applied to a leaf analysis study of tree nutrition. Tentative optimum concentrations are presented at each of 4 sampling dates for N, P, K, Ca, Mg, S, B, Mn, and Cu for both species and also for Zn and Fe in the case of peach. The results showed clearly that seasonal trends must be considered in setting up these standards. Statistical analysis of the data showed that the variance in the element concentrations between orchards was, in general, no greater than that between the sampling dates or the years. With peach the variation between dates of sampling was considerably greater than between orchards or years. The reasonable consistency of the results obtained over a wide range of soil types supports the general validity of the concept and suggests that further work would be fruitful.

2602. WALRATH, E. K., AND SMITH, R. C.

Survey of forty apple orchards.

Proc. Amer. Soc. hort. Sci., 1952, 60: 22-32, bibl. 10.

During 3 successive years leaf and soil samples were taken over a 2-week period around 1 August in productive, mature orchards, 20 of which were situated in Pennsylvania and 20 in New England. Some 10 varieties were included in different proportions. Leaf analyses, which are tabulated, proved a valuable guide to nutritional status, and appeared to be much more closely related to visual observation of tree condition than did soil analyses. Soil analyses could be very misleading except as an indication of lime requirements. A better nutrient balance would result, especially in New England, from the increased application of Mg and Ca, as magnesian limestone, and sometimes from applications of B, P and K. The levels of Mn, Cu, Fe and Zn were generally satisfactory.

2603. BATJER, L. P., AND ROGERS, B. L.

Fertilizer applications as related to nitrogen, phosphorus, potassium, calcium, and magnesium utilization by apple trees.

Proc. Amer. Soc. hort. Sci., 1952, 60: 1-6, bibl. 4.

On soils in 3 typical orchards in central Washington State with inherently high contents of P and K there were no distinct differences in tissue composition between Delicious apple trees that had received N only, at $1\frac{1}{2}$ - $1\frac{3}{4}$ lb. per tree, during the preceding 10 years, and trees that had received N at $1\frac{1}{2}$ - $1\frac{3}{4}$ lb. + P at $1-1\frac{1}{2}$ lb. + K at $2-2\frac{1}{2}$ lb. The trees in each case were 28 to 30 years old and were yielding at an average yearly rate of about 1,000 packed boxes per acre. There was no evidence that P and K applications had any antagonistic effect on the N, P, K, Ca or Mg contents of various tissues. Calculations of the total yearly intake and utilization of the different elements showed that Ca was used in the greatest quantities followed by K, N, Mg and P. Differences in contents of old and young, top and root tissues indicated that mature apple trees are able to store and later transfer and re-utilize about 0.38 lb. N, 0.06 lb. P, 0.04 lb. K and 0.02 lb. Mg. With N and P in particular these amounts represent a substantial proportion of the tree's yearly requirements.

2604. WEEKS, W. D., AND OTHERS.

The effect of rates and sources of nitrogen, phosphorus, and potassium on the mineral composition of McIntosh foliage and fruit color.

Proc. Amer. Soc. hort. Sci., 1952, 60: 11-21, bibl. 10, being *Contr. Mass. agric. Exp. Stat.* 841.

Ten different N treatments were applied from 1949 onwards to vigorous 16-year-old McIntosh apple trees growing in grass which was mown and left to lie at least twice each season. The treatments involved 3 levels of organic N from applied hay, 3 levels of ammonium nitrate, hay+nitrate, a mixed NPK fertilizer, NPK+nitrate, and a urea spray. The effects of inorganic N on chemical composition of leaves, yields and fruit quality were more marked than those of comparable amounts of organic N. High inorganic N, as compared with low inorganic N, increased leaf N, Mg and Ca and decreased leaf K and P. Leaf K was higher when K as well as N was applied and highest when hay mulch was applied. Increases in leaf N were associated with depressed fruit colour, whereas increases in leaf K were associated with increased colour. High rates of inorganic N increased total yields but reduced yields of fancy fruit. High N trees produced the softest fruit and low N trees the hardest.

2605. KOLOMIEC, I. A.

The influence of mineral fertilizers on the formation of reproductive organs in young apple trees. [Russian.]

Bot. Zurnal, 1952, 37: 458-76, bibl. 17, illus.

In the course of a study at the Ukrainian Institute for Fruitgrowing (Kiev) it was found that apple trees, irrespective of variety and character of rootstocks, can form reproductive organs during their first year, provided the cells in the growing points on the stem have an adequate supply of nutrients. Application of increased amounts of fertilizers or ringing of stems during active growth stimulated fruit bud induction in 1-year-old trees grown in pots. For fruit buds a higher concentration of cell sap is required than that needed by vegetative buds. Trials with the apple variety Borovinka grown in pots have shown that a single fertilizer treatment, applied at the rate of 83 mg. N, 94 mg. K₂O and 70 mg. P₂O₅ per kg. soil, at the beginning of the season produced the best tree growth, but the greatest number of fruit buds was produced by 3 treatments applied during the active period of growth. Profuse flowering and fruiting, however, reduced fruit bud formation even in the presence of adequate nutrients.

2606. ANNE, P., DUPUIS, M., AND MAROCKE, R.

La nutrition minérale du cerisier. (Mineral nutrition of the cherry.)

Ann. agron. Sér. A, 1952, 3: 678-9.

Study of the mineral nutrition of the cherry tree was continued at Colmar Agronomy Station in 1951. As in the previous year fertilizer was applied at rates per ha. equivalent to 180 kg. N, 360 kg. P₂O₅ and 540 kg. K₂O; half was applied liquid in spring-summer and the rest dry in the autumn. The effect of N continued to manifest itself as an increase in the number and size of the leaves and a darkening of their colour.

Where N and K were both deficient and where K was applied an improvement in health was first noticeable in 1951 and was accompanied by an increase in leaf K as compared with the controls; K absorption only began after several years' application of large quantities of K fertilizer; K was apparently less readily absorbed in the absence of N fertilizer. Unhealthy trees generally had a lower N and a higher P content; for these two elements separately the differences were small, but the N/P ratio differentiated between trees with deficient and with adequate N. Trees with low K had high Ca contents and relatively high Ca/K ratios.

2607. HILL, H., AND HEENEY, H. B.
Storage studies in relation to apple tree nutrition.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 3.

The results of experiments carried out since 1948 in Ontario show that the relationship between the storage quality of McIntosh apples (Y) and the percentage total nitrogen in the foliage in mid-July (X) may be represented by the equation $Y = 93.91 - 15.22 X$. Very similar results were obtained with the Spy variety, the equation in this case being $Y = 119.58 - 24.62 X$. With the McIntosh variety the quality of the fruit dropped sharply if the N level rose above 2.1% in mid-July. K was found to have a definite but lesser effect than N on storage quality, and it is considered that if the K levels in the foliage in mid-July fall below 1.7% of the dry weight the storage quality will be reduced.

2608. BOLLARD, E. G.
Nitrogen metabolism of apple trees.
Nature, 1953, 171: 571-2, bibl. 6, illus.

During work in New Zealand on stock-scion nutrient interrelations involving 3 varieties and 3 rootstocks the level and forms of N present in the tracheal sap of 1-year-old shoots of mature apple trees were determined at different seasons. During winter the sap contained approximately 10 μg . N per ml. This increased to 20 μg . about 3 weeks before blossoming, rising to a peak of 150 μg . at flowering (about 1 October). This level was maintained for about 3 weeks and thereafter there was a gradual decline to 20 μg . by the end of January and to 10 μg . by the end of March. Apart from a small amount of ammonia-N, amide- and amino-N accounted for all the N present, indicating that complete reduction of nitrate occurs in the roots. It would appear, too, that a significant part, if not all, the N absorbed by the roots passes to the scion in the xylem sap. Examination of the individual N compounds present by paper chromatography showed the chief constituents to be glutamine, asparagine, aspartic acid and, to a lesser extent, glutamic acid. Present in smaller amounts were serine, threonine, arginine, methionine, valine and leucine, and sometimes present in traces were alanine, tyrosine and γ -aminobutyric acid. A peptide was also probably present. It is hoped to publish these results in more detail elsewhere.—*Fruit Res. Stat., D.S.I.R., Auckland*.

2609. PROEBSTING, E. L., AND TATE, R.
Seasonal changes in nitrate content of fig leaves.
Proc. Amer. Soc. hort. Sci., 1952, 60: 7-10, bibl. 2.

The presence of high concentrations of nitrate in fig

leaves has been established. Seasonal curves show a sharp drop in the spring with usually a further decrease throughout the summer. Reducase has been demonstrated in the leaves, suggesting that nitrate is translocated to the leaves, reduced there and the synthesized nitrogen translocated elsewhere in the tree. The practical application of these curves must wait on the development of more analyses from trees of known performance. [Authors' summary.]—*Univ. Calif., Davis*.

2610. COLLIER, D., AND GACHON, L.
Étude de la fumure du pommier en Auvergne. (Apple fertilizer trials in Auvergne.)
Ann. agron. Sér. A, 1952, 3: 675-8.

The apple fertilizer trials described began in 1948 on volcanic alluvial soils in Auvergne. One trial was conducted with Canada on Noir de Monton planted in 1947 at 156 trees per ha., and the other with Reinette du Mans on Doucin de Fontenay planted in 1946 at 465 trees per ha. Annual applications were made in March/April of various combinations of N, P and K at the following levels in kg./ha.: N as ammonium nitrate at 20-60; P as bicalcium phosphate at 20 or 50 or as superphosphate at 30 or 75; and K as K sulphate at 40-130. After the first 4 years no significant effect of the fertilizer treatment on the vigour of the trees was observable.

2611. DEPARDON, L., BURON, P., AND MAUVISEAU, —.
Expérience sur pommiers de plein vent (variété: Reinette du Mans). (A [fertilizer] experiment on standard apple trees (Reinette du Mans).)
Ann. agron. Sér. A, 1952, 3: 685-6.

The objects of this experiment, begun on a calcareous clay soil in the Blois area some years ago, are to compare the effect of dry and liquid fertilizer and to find a suitable formula. The formulas employed for an anticipated yield of 100 kg. of fruit per tree are 1-1-2 (250 g. N - 250 g. P_2O_5 - 500 g. K_2O) and 1.5-1-2 (375 g. N - 250 g. P_2O_5 - 500 g. K_2O). The dry and liquid fertilizers were applied under the edge of the crown and the doses were based on an estimated yield of 80 kg. fruit per tree (13-year-old trees). The dry fertilizer was applied in mid-May and the liquid was given in 3 applications in mid-May, early July, and early September. The average yields per tree (of 6-9 trees) were: dry 1-1-2 fertilizer 54 kg.; liquid 1-1-2 51 kg.; liquid 1.5-1-2 43 kg.; and control 39 kg. No conclusions can yet be drawn regarding the method of application or the formula. As in previous years foliar diagnosis yielded no definite results concerning N and P, but from August onwards the K content was always below the 1.5% of dry matter regarded as the minimum, despite the fact that the trees were very healthy.

2612. SHIBUKAWA, J., AND NARITA, H.
On the foliar fertilization of apple trees with urea. [Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1952, 21: 149-54, bibl. 12, illus.

Field and pot experiments in the application of urea fertilizer to leaves of apple trees were conducted at the Aomori Apple Experiment Station in 1951 and 1952. Urea sprays (1) did not cause leaf burn at 5 lb. urea per 100 gal. water but did at 10 lb.; (2) improved leaf

colour and N content of leaves and growing points but did not significantly affect fruit colour and size; (3) caused weak young Jonathans which had not formed flower buds for some time to flower on 28% of the treated terminal buds compared with 3% on the unsprayed controls; (4) mixed with lime-sulphur and bordeaux mixture and applied at the end of July to mid-August, were absorbed at the same rate as urea alone and did not cause leaf burn.

2613. BULLOCK, R. M., BENSON, N. R., AND TSAI, B. K. W.

Absorption of urea sprays on peach trees.
Proc. Amer. Soc. hort. Sci., 1952, 60: 71-4, bibl. 6, being *Sci. Pap. Wash. St. agric. Exp. Stat.* 1087.

The N content of Elberta peach foliage in the field was greatest when part of the N was applied to the soil and the remainder as a urea spray. With an increase in foliage N, the maturity of the fruit was retarded. Under greenhouse conditions, absorption of urea by Elberta peach leaves was demonstrated when sprayed at 15 lb. per 100 gal. but not when a spray of only 5 lb. per 100 gal. was used. [From authors' conclusions.]

2614. EGGERT, R., KARDOS, L. T., AND SMITH, R. D.

The relative absorption of phosphorus by apple trees and fruits from foliar sprays, and from soil applications of fertilizer, using radioactive phosphorus as a tracer.

Proc. Amer. Soc. hort. Sci., 1952, 60: 75-86, bibl. 8, being *Sci. Contr. N.H. agric. Exp. Stat.* 148.

In greenhouse studies young own-rooted trees of *Malus robusta* No. 5 were sprayed on 5 April with 5 radioactive P salts. P^{32} was absorbed and translocated in largest amounts from di-ammonium phosphate. Absorption occurred continuously over 30 days without re-moistening of the leaves. From 2 to 3% of the P_2O_5 in the plants came from the spray and over half of this was translocated to the roots. P^{32} also moved into newly developing leaves. In field experiments 25-year-old McIntosh trees were sprayed with di-ammonium phosphate at the beginning of June. The largest amounts of P^{32} were subsequently found in fruit cores, seeds and sub-epidermal tissues. With soil application of P^{32} to trees growing either under mulch or sod none was recovered by the trees when the fertilizer penetrated to a depth of 2 in., 2.68 to 3.78% was recovered when penetration was 4 in., and up to 5.77% when penetration was 8 in.

2615. FRITZSCHE, R.

Das Düngen der Obstbäume nicht vergessen.
(The manuring of fruit trees.)
Schweiz. Z. Obst- u. Weinb., 1953, 62: 119-22, illus.

Two new machines for the application of liquid fertilizers by soil injection are briefly described, one of them being illustrated. Costs are considered.

2616. WILCOX, J. C., AND MASON, J. L.

Consumptive use of water in orchard soils.
I. Effects of soil depth.
Canad. J. agric. Sci., 1953, 33: 101-15, bibl. 17, being *Contr. Div. Hort., exp. Fms Serv., Ottawa* 789.

A description is given of 2 investigations at the Dominion Experimental Station, Summerland, B.C., on the effects of depth of soil on the rate of consumptive use of water from orchard soils. In the first investigation, 41 determinations of consumptive use were made in mature apple orchards. The procedure used was to take soil samples to a depth of six feet following an irrigation and again prior to the next irrigation, determine their moisture contents, and from the data obtained determine the rate of consumptive use per day for each foot of depth. It was found that the rate of consumptive use was greater in the top foot, and decreased progressively with an increase in depth. In older orchards there was still some consumptive use at a depth of six feet. In most cases, the rate of consumptive use was negligible below a depth of four feet. In the second investigation, two unirrigated plots of apple trees were selected for study. Changes in moisture content throughout the season were determined by periodic sampling of the soil and by the use of Bouyoucos gypsum resistance blocks. Early in the season, the rate of consumptive use was greatest near the surface and decreased with greater depth. As the top foot of soil dried out, however, the rate of water use increased in the second and third feet, and later still in the fourth and fifth feet. By the end of the season almost all of the soil to the fourth foot had dried to the wilting point; thus, the total consumptive use for the season showed only a comparatively small decrease with an increase in depth to four feet. [See also *H.A.*, 23: 227.]

2617. ROGERS, W. S., AND GOODE, J. E.

Irrigation requirements of fruit orchards.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 171-3.

The use of a "water balance sheet" for fruit plantations, based on rainfall, transpiration and soil data, and the use of soil moisture tensiometers to supplement or replace such calculations are described. It is provisionally suggested that irrigation, when about 50% of the available soil water has been used, is desirable if maximum growth, yield, and fruit size are required. The economics of irrigation are not dealt with in this paper. [Authors' summary.]

2618. HENDRICKSON, A. H., AND VEILMEYER, F. J.

Orchard sprinkler irrigation.
Calif. Agric., 1953, 7 (4): 3, 12, illus.

This progress report of studies with plums and pears, illustrated by soil moisture distribution graphs, shows that increases in fruit size were essentially equal under both furrow and sprinkler irrigation, provided the soil moisture was not allowed to drop to the permanent wilting percentage during the growing period.

2619. CANDIOLI, P.

Alcune notizie su un impianto di irrigazione a pioggia del Ravennate. (Notes on a sprinkler irrigation installation at Ravenna.)
Agric. Venezie, 1953, 7: 141-8, illus.

Peach, apple and pear are among the crops irrigated. The installation is powered by a 25 h.p. electric motor and draws water from a river. The main pipe system is underground and thus permanent. The sprinkler apparatus delivers $1\frac{1}{2}$ -3 l. per second at $2\frac{1}{2}$ -3 atmospheres' pressure and has an effective range of 15 m. Ordinarily irrigation is necessary only in July-August.

The average number of irrigations per annum is one (occasionally two) of 2½ hours' duration, 200 cu. m. of water per ha. being supplied per irrigation. The results are an average increase of 22% in fruit production, higher sugar content, better colouring, extended maturation period, more succulent and less fibrous pulp, and better storage qualities (peaches in 1952).

Composition of fruit.

2620. NAALDWIJK.

Gewasanalyse. (Crop analysis.)
Jaaversl. Proefstat. Groent. Fruit. Glas., 1952, pp. 21-2.

The sugar contents of several varieties of grapes, plums and peaches at various stages of maturity are recorded.

2621. HOPE, G. W., AND TOWNSEND, L. R.

Chemical composition of fruits.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Ctte 1951, pp. 4.

Figures are given for the percentage malic acid, specific gravity, percentage soluble solids and percentage tannin and colouring matter of the juice of 9 apple varieties stored for different lengths of time in common storage. The changes in juice composition during storage can thus be followed. Tables also give the results of analyses of the fresh juice of 17 cherry varieties, showing percentage sugar, percentage tannin, ratio tannin/sugar, and flavour rating, and of the juice of 5 varieties of rhubarb.—Exp. Stat., Kentville, N.S.

2622. ITO, S., AND SAKASEGAWA, H.

Studies on the constituents of fruit juices by paper partition chromatography. Part I. Sugars and organic acids in several fruit juices.

Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat., 1952, No. 1, pp. 225-35, bibl. 15, 236-41, bibl. 10.

The sugars and organic acids in the juice of loquat, cherry, musk-melon, peach, Japanese pear, European pear, Chinese pear, grape, Japanese persimmon, Satsuma orange, Natsudaidai orange and lemon were determined by paper partition chromatography.

2623. ZUMAN, P.

Die Bestimmung von Sulfhydrilstoffen in einigen Früchten. (Estimation of sulphhydril in some fruits.)

Coll. Czech. chem. Commun., 1953, 16: 510-25, bibl. 64.

The process of estimation is described and tables are presented showing the sulphhydril and ascorbic acid contents of varieties of currants (red, white and black), raspberries, gooseberries, cherries, apricots, melons, nuts, tomatoes and other fruits.

2624. POAPST, P. A.

Maturity studies.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Ctte 1951, pp. 3.

On the basis of 2 years' work there appears to be a correlation between drop in McIntosh apples and the starch content of the fruit, abscission occurring at a starch-iodine index of approximately 6.—Hort. Div. Ottawa.

2625. HULME, A. C.

The isolation of chlorogenic acid from the apple fruit.

Biochem. J., 1953, 53: 337-40, bibl. 24.

1. The occurrence and possible function of chlorogenic acid in plants is discussed. 2. A method is described whereby the acid can be isolated free of catechins from the young fruits of Worcester Pearmain apples. 3. An estimation is made of the amount of chlorogenic acid present in these young apples. 4. Its possible relationship to quinic acid, also present in the fruits, is discussed. [Author's summary.]

2626. DŽAMIĆ, M.

A study of the dynamics of pectic substances in Jugoslav fruits. I. [Serbian, with French summary 1½ p.]

Yearb. Fac. Agric. Belgrade, 1952, pp. 251-67, bibl. 15.

Results of analyses presented indicate that the percentage of pectic substances contained in 5 apple varieties, including Gold Pearmain, reached its maximum from the end of July to the middle of August. Variations in the decrease of pectins after the peak had been reached were correlated with differences in ripening and deterioration of the varieties studied.

2627. POLLARD, A.

What makes the flavour of an apple.
Grower, 1953, 39: 874-5.

In this popular article the effects of the acid-sugar-tannin balance, the texture and the aromatic substances of the fruit on flavour are discussed.

2628. KENWORTHY, A. L., AND MITCHELL, A. E.

Soluble solids in Montmorency cherries at harvest as influenced by soil management practices.

Proc. Amer. Soc. hort. Sci., 1952, 60: 91-6, bibl. 6, being *J. Art. Mich. agric. Exp. Stat.* 1339.

A 3-year study indicated that the influence of various soil management practices upon the soluble solids content of Montmorency cherry fruits appeared to be dependent upon season, and especially upon the moisture supply at, or just prior to, harvest. Deficiencies of moisture and N appeared to increase the level of soluble solids. Soil management practices, such as alfalfa mulch, straw mulch, clean cultivation and N fertilizers, that increased soil moisture and/or N, tended to lower soluble solids, by comparison with grass cover crops, sawdust mulch and no fertilizer.

Pruning and training.

2629. THOMAS, L. A.

Stock and scion investigations. VIII. A pruning and rootstock trial with apple trees.

J. hort. Sci., 1953, 28: 125-30, bibl. 3.

Jonathan apple trees [at Stanthorpe, Qd] on the clonal rootstocks M. XII, S.4 and Ivory's Double Vigour were given 3 pruning treatments for eleven years from their planting in 1939, i.e. hard pruning, medium pruning and pruning by a modified Wicken's method. This latter consisted of leaving all leaders unpruned for the first 6 years, keeping the centre of the tree open, thinning the bunched shoots at the leader tips to one,

and removing all fruit from the leader tips. Trees pruned by Wicken's method grew larger and bore heavier crops than did those that were hard or medium pruned. Confirmatory results were obtained with Granny Smith on S.4 rootstock. A vigorous rootstock appears desirable for trees which are to be pruned by the Wicken's method. Ivory's Double Vigour produced a much less vigorous tree with Jonathan and Granny Smith than did S.4 or M. XII rootstocks.—C.S.I.R.O., Queensland.

2630. RENAUD, M.

Nouvelle methode de taille des arbres à feuilles caduques. (A new method of training pome and stone fruit trees.)
Congr. pomol. Fr. 1952, being *Suppl. Pomol. franç.*, 1953, pp. 253-8, illus.

A new method of training pome and stone fruit trees has been developed in Algeria since 1947. Trees trained by the method have an open crown; their framework branches are few, with few secondary branches, slender, strong, supple and naturally short; the fruiting branches are numerous and of equal vigour. The basic principles are open training and light pruning, especially in youth. The framework branches are never cut back and stop growth in length after 3-5 years according to species and vigour; the tree can be improved by increasing or replacing the framework branches by water-sprouts which arise mainly in the lower third of the tree. Pruning the bearing tree consists principally of keeping the tree open. Tipping of fruiting branches is practised only as a complement to thinning, to limit excess yield.

2631. WENZL, H.

Die Überwallung von Schnittwunden an Obstbäumen in Abhängigkeit von Jahreszeit und Wundbehandlung. (The healing of pruning cuts on fruit trees in relation to season and wound treatment.) [English summary 1 p.]
PflSch. Ber. Wien, 1953, 10: 40-51, bibl. 8, illus.

An earlier statement indicating that the callusing over of autumn-inflicted, untreated pruning wounds is slower than that of spring wounds is confirmed, but the disadvantages of autumn or winter pruning can be eliminated by applying wound dressings such as waxes and wax-tars. Wound dressings, while generally recommended, are shown to be of greater importance for autumn pruned and weak trees than for spring pruned and vigorous trees. The effect of wound dressings applied to autumn cuts is less dependent on the thickness of the layer than with spring cuts; an extremely thick layer does not have, or has only to a limited extent, the disadvantages which become evident when applied to spring cuts.

Spraying for cultural purposes.

(See also 2672q.)

2632. BATJER, L. P.

Factors affecting results with dinitro thinning sprays.

Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 158-61.

Factors discussed include time and method of application, material and its concentration, varietal response, tree vigour, pollination and weather conditions.

2633. PICKETT, W. F., AND BATES, J. C.

The influence of naphthalene acetic acid and sodium dinitro foliage sprays on the internal structure of Jonathan apple leaves.

Proc. Amer. Soc. hort. Sci., 1952, 60: 173-4, bibl. 2, being *Contr. Kans. agric. Exp. Stat., Dep. Hort.*, 229.

The R value (ratio of internally exposed surface to the external surface of the leaf) was determined as a measure of the photosynthetic activity of Jonathan apple leaves that had received 1, 2 or 3 applications of NAA or DN (23% sodium dinitro-o-cresylate) during March. The R values of leaves receiving 3 applications were significantly higher than those of control leaves and leaves receiving 1 or 2 applications. There were no differences in R value between leaves treated with equal numbers of applications of 2 different concentrations of each material.

2634. WATSON, D. P.

Effect of Elgetol sprays on pistils of apple flowers.

Proc. Amer. Soc. hort. Sci., 1952, 60: 151-4, bibl. 4, illus.

Apple flowers were hand pollinated and treated with a commercial spray of Elgetol [1 qt. sodium dinitro-o-cresylate to 100 gal. water], at various periods after pollination. Records were made of the fruit set and examinations were made of hand pollinated treated and untreated pistils. No relation was established between number and length of pollen tubes in pistils from treated and untreated flowers. It was shown that blossom sprays of Elgetol seriously reduced the yield of fruit, destroyed the receptive nature of the stigma, caused dehydration, browning, and death of the papillate cells of the stigma as well as epidermal and outer carpillary cells of the style. [Author's summary.]

2635. BLAIR, D. S.

Chemical thinning of apples.

89th A.R. N. Scotia Fruit Grs' Ass., 1952, pp. 21-2, being *Contr. Div. Hort., exp. Fms Serv., Ottawa*, 802.

For the heavy setting varieties such as Melba and Wealthy, DN compounds are recommended to be applied at full bloom, while on the varieties like McIntosh, Delicious and Northern Spy, which normally do not set a heavy crop, NAA preparations should be sprayed at or soon after the calyx stage.

2636. SOUTHWICK, F. W., AND WEEKS, W. D.

The influence of chemical thinning treatments on yield and flowering of apples.

Proc. Amer. Soc. hort. Sci., 1952, 60: 165-72, bibl. 3, being *Contr. Mass. agric. Exp. Stat.* 835.

Data from several series of tests carried out over 3 seasons show that post-calyx sprays of NAA or NaNAA effectively reduce the total number of fruits but increase the volume and proportion of large fruits. Biennial bearing tendencies appear to be reduced. Dust formulations of NAA materials proved as effective as comparable dosages of sprays. No additional thinning resulted

from a second application of NAA about 1 week after the first but still prior to the June drop. In general, at a given time of application increases in concentration in the range of 15 to 30 p.p.m. increased the amount of thinning, but above these levels no further reduction in set occurred. Frequently the earlier a given concentration was applied, the greater was its thinning effect. However, there were varietal exceptions both as regards reaction to concentrations and to timing, and there were also differences in response due to environment.

2637. EDGERTON, L. J., AND HOFFMAN, M. B.
The effect of thinning peaches with bloom and post-bloom sprays on the cold hardiness of the fruit buds.
Proc. Amer. Soc. hort. Sci., 1952, 60: 155-9, bibl. 4, illus.

In 4 peach orchards in New York State comparisons were made between blossom thinning by dinitro sprays, post-blossom thinning by the sodium salt of naphthaleneacetic acid (NaNAA), and hand thinning after the June drop. Responses to NaNAA varied with the variety and concentration, the best results being obtained with 15 p.p.m. on Golden Jubilee, 20 p.p.m. on Raritan Rose, 30 p.p.m. on Halehaven and 40 p.p.m. on Redhaven. Although NaNAA caused slight leaf and shoot modification it had no deleterious effect on fruit bud hardiness the following winter. Where satisfactory thinning was accomplished the fruit buds were as hardy as, or slightly harder than, those of the hand-thinned control trees, but slightly less hardy than those of trees thinned with dinitro at blossom time. The effect on hardiness would appear to be related to the relative amounts of food reserve resulting from thinning at blossoming and a month later.

2638. REDMAN, R., Jr.
Blossom thinning of peaches with water.
Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 166.

Water thinning is done by removing the swirl from the spray gun and criss-crossing the limbs with a stream of water delivered at 600 lb. pressure. It is said to have given as good results as hand thinning and better than chemical thinning.

2639.*BATJER, L. P., AND ROGERS, B. L.
What is the best stop-drop spray for apples and pears?
Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 175-7.

Summarized recommendations are made for the prevention of pre-harvest drop in Bartlett pears, and in Delicious, Winesap, McIntosh and other apple varieties. NAA appears to be the most generally recommended chemical, followed by 2,4,5-TP and the sodium salt or amine form of 2,4-D.

2640.*BLAIR, D. S.
Reduction of pre-harvest drop in apples by spraying with growth regulating substances.
89th A.R. N. Scotia Fruit Grs' Ass., 1952, pp. 12-15, being *Contr. Div. Hort., exp. Fms Serv., Ottawa*, 803.

* In the originals of abstracts 2639-2646 trichlorophenoxypropionic acid is abbreviated variously as T-P, T.P., TP and Tp. In all cases we give it here as TP.—ED.

On the basis of the trials conducted at Ottawa, Smithfield and Ste. Clothilde, it is apparent that both 2,4,5-TA [trichlorophenoxyacetic acid] and 2,4,5-TP [trichlorophenoxypropionic acid] are quite effective in reducing the pre-harvest drop of apples. 2,4,5-TP, although not having as long a period of effectiveness as 2,4,5-TA, gave an increase in the red colour of the apples especially in early maturing fruits. The most significant result of the trials was that in comparison with the present widely used NAA preparations, the new hormones had a longer period of effectiveness. For this reason, 2,4,5-TP is recommended to replace the NAA preparations as a pre-harvest spray applied at the rate of 20 p.p.m. ten days prior to anticipated harvest of the variety concerned. 2,4,5-TA is not yet being recommended, since there is not sufficient information on the effect of this chemical on the storage life and keeping quality of the apples. [From author's conclusions.]

2641.*FISHER, D. V., AND PORRITT, S. W.
The use of triethanolamine salt of 2,4,5-trichlorophenoxypropionic acid (Color-Set 1004) as a stop-drop spray for apples.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 5.

Color-Set 1004 was applied at the rate of 900 gal. per acre with a concentration of 20 p.p.m. to McIntosh and Delicious apples in six orchards in the Okanagan district. Sprays were applied 10-15 days before harvest with McIntosh and 28-37 days before harvest with Delicious. In orchards where dropping occurred, the spray proved highly effective, even under severe wind-storm conditions. Laboratory tests indicated no differences in rate of respiration, maturity or eating quality between sprayed and unsprayed fruit.—*Exp. Stat., Summerland, B.C.*

2642.*THOMPSON, A. H.
Further experiments with 2,4,5-trichlorophenoxypropionic acid sprays for control of the preharvest drop of apples.
Proc. Amer. Soc. hort. Sci., 1952, 60: 175-83, bibl. 3, being *Sci. Art. W. Va agric. Exp. Stat.* 449.

From field experiments in West Virginia on several important varieties of apple, described here and previously [see *H.A.*, 22: 2201], it is concluded that: (1) 2,4,5-TP directly ripens and colours summer apples; little or no direct effects of this kind have been found on fall and winter varieties. (2) Temperature at the time of application has no influence on the effectiveness of 2,4,5-TP sprays. (3) 2,4,5-TP is compatible with DDT, DDD, and parathion in the spray tank. No reduction in preharvest drop control was noted following combination of 2,4,5-TP with these materials compared to the use of 2,4,5-TP alone. (4) Concentrate applications of 2,4,5-TP are commercially feasible. It is suggested that the concentrate spray should provide at least 50% of the actual 2,4,5-TP required per tree in a normal dilute spray. (5) 2,4,5-TP is considerably more effective than NAA in delaying the preharvest drop of apples. [From author's summary and conclusions.]

* In the originals of abstracts 2639-2646 trichlorophenoxypropionic acid is abbreviated variously as T-P, T.P., TP and Tp. In all cases we give it here as TP.—ED.

2643.*ERICKSON, L. C., BRANNAMAN, B. L., AND HIELD, H. Z.

Response of Delicious and Rome Beauty apples to a preharvest spray of 2,4,5-trichlorophenoxypropionic acid in southern California. *Proc. Amer. Soc. hort. Sci.*, 1952, 60: 160-4, bibl. 6.

2,4,5-trichlorophenoxypropionic acid sprays [at 10 and 20 p.p.m.] effectively reduced preharvest drop of Delicious and Rome Beauty apples under southern California conditions. Delicious apples from trees sprayed with 2,4,5-trichlorophenoxypropionic acid in some cases had significantly greater soluble solids contents than ones from non-sprayed trees. Starch content and acidity of Delicious apples were not affected by the spray. [Authors' summary.]

2644.*POAPST, P.

Storage behavior of McIntosh apples treated with a pre-harvest application of a triethanol-amine salt of α -(2,4,5-trichlorophenoxy)-propionic acid.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 9.

In a small-scale trial, applications of 2,4,5-TP at 20 p.p.m. did not cause a significant reduction in fruit size but increased the amount of blush coverage. Three out of four comparisons failed to show differences in respiratory levels between treated and check fruits. Pectin metabolism was stimulated, resulting in slightly softer fruit. No effect was observed on the occurrence of physiological disorders and no chemical injury was sustained.—Hort. Div., Ottawa.

2645.*NELSON, S. H., AND PHILLIPS, W. R.

Storage behaviour of McIntosh apples after orchard applications of 2,4,5-T.P.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, 1 p.

At Ottawa McIntosh apples were sprayed with 20 p.p.m. 2,4,5-TP at 17, 11 and 6 days before harvest to prevent pre-harvest drop. The fruit was examined after 100 days' storage at 32° F. followed by exposure to 65° F. for a week. The texture and flavour of the sprayed fruit was poorer than that of unsprayed fruit and the percentage of sound fruit was lower, although there was no difference due to time of treatment. There was, however, a positive correlation between early application and high fungal rot occurrence; the unsprayed trees had the least fungal rots. As the differences between sprayed and unsprayed trees was small, it is stated that no conclusions can be drawn from this year's work.

2646.*SMOCK, R. M., EDGERTON, L. J., AND HOFFMAN, M. B.

Inhibition of the ripening effect of certain auxins on apples with maleic hydrazide.

Proc. Amer. Soc. hort. Sci., 1952, 60: 184-92, bibl. 5.

Maleic hydrazide when sprayed on apple trees prior to harvest retarded fruit softening rate on the tree and after harvest during a holding period at 74° F. This material sometimes (but not always) retarded respiration.

* In the originals of abstracts 2639-2646 trichlorophenoxypropionic acid is abbreviated variously as T-P, T.P., TP and Tp. In all cases we give it here as TP.—Ed.

tion rate of sprayed fruits after harvest. When maleic hydrazide was sprayed on apple trees in combination with certain auxin materials [notably 2,4,5-TP] it tended to nullify the ripening effect of the auxins without interfering with their desired effect. [Authors' summary.]—Cornell Univ.

Harvesting, marketing and utilization.

(See also 2503, 2504, 2672d, g.)

2647. COURSHEE, R. J.

Fruit grading machinery. A survey. Parts I, II and III.

[*Publ. nat. Inst. agric. Engng C.S.20*, 1952, pp. 104, 97 and 93 respectively, all illus., 5s. each.]

In 1950 the results of trials on 8 types of fruit and tomato graders were presented [see *H.A.*, 21: 219], data being recorded on throughput, accuracy and damage caused by the machine. Since then a further 14 graders have been examined. Part I of this report gives an account of the testing technique and a summary of the results obtained with each of the 22 graders examined. Parts II and III give more detailed reports on the 14 graders examined since 1950.

2648. DESROSIER, N. W., BILLERBECK, F. W., AND TUKEY, R. B.

Color grading of red apple varieties with the Purdue Color Ratio Meter.

Proc. Amer. Soc. hort. Sci., 1952, 60: 209-12, bibl. 2, illus., being *J. Pap. Purdue agric. Exp. Stat.*, 596.

The application of this instrument, developed for the colour grading of tomatoes, to the problem of colour grading of apples is described.

2649. FRANCIS, F. J.

A method of measuring the skin color of apples.

Proc. Amer. Soc. hort. Sci., 1952, 60: 213-20, bibl. 13, illus.

An attachment has been developed for use with either the Hunter Color and Color-Difference Meter or the Photovolt Reflection Meter No. 610 to measure skin colour in apples. Comparisons between visual colour scores and both instrument readings show a high correlation for all sizes of apple. Of the two instruments the Hunter is the more accurate, but the Photovolt is much the less expensive. The ratio of red and green in McIntosh apples varies with size of apple, being highest in fruits of 2 $\frac{1}{2}$ -2 $\frac{1}{2}$ in. in diameter and decreasing with larger or smaller fruits.—Ontario agric. Coll., Guelph.

2650. FRENCH, B. C.

Efficiency in fruit marketing. Part VII.

Calif. Agric., 1953, 7 (1): 10-12, illus.

An analysis is made of the organization and cost of lidding operations in 34 California pear, apple and grape packing houses. In the grape houses 3 types of lidders were used, a stitcher type, a low-speed semi-automatic type, and a high-speed nearly fully automatic type. The apple and pear houses studied all used the intermediate low-speed type. Factors affecting costs, apart from the type of equipment, included arrangements for inserting top pads (in the case of apples and pears), size of plant and length of season.

2651. BRESSLER, R. G., AND FRENCH, B. C.

Efficiency in fruit marketing. Part VIII.

Calif. Agric., 1953, 7 (2): 13-15, and 7 (3): 11-13, 16.

A study was made in 9 Californian apple and pear packing houses and 8 olive processing plants of the separate-lot system in which fruit received from each grower is run through separately up to the stages of sizing and grading. Various short-cut procedures are in use and, although these introduce the risk of error, growers' interests are reasonably well protected. In apple and pear houses the loss of effective time due to break-for-lot checks ranged from 3% to 28%. In olive plants, generally handling much smaller lots, the range of loss of time was 7% to 24%. The main factors involved were size of lot and the duration of stoppages. Effects on operating costs are indicated.

The second section of the paper is concerned with the accuracy and cost of small-sample grading systems, operating within limits of admissible error ranging from 0.5% to 5.0% of total weight in all grades. The proportions of fruit that have to be sampled depend on the total amount of fruit delivered per lot or per season. These are indicated graphically. Thus, for example, if the desired degree of accuracy is limited to 1% it is shown that for 3,000 fruits per season 24.3% should be sampled, for 9,000 fruits 9.6% and for 300,000 fruits 3.1%. Costs are considered in detail. In all apple and pear packing houses the sampling system with a limit of admissible error of 1% was less costly than separate-lot systems. Limiting the admissible error to 0.5% increased sampling costs sharply, but despite this sampling remained less costly than the separate-lot systems in 5 out of 9 plants. Differences between the two systems were less pronounced in olive plants. With 1% accuracy sampling was slightly more economical in 7 out of 8 plants, but the position was reversed with 0.5% accuracy.

2652. SAMMET, L. L.

Efficiency in fruit marketing. Part IX.

Calif. Agric., 1953, 7 (4): 14-16, illus.

A comparison of labour and equipment costs in 15 California pear and apple packing houses is made for 5 methods of "dumping field lugs".

2653. PHILLIPS, W. R., AND POAPST, P. A.

Bruising trials.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Citee 1951, pp. 4.

In semi-commercial trials comparing the wastage during storage of apples graded at harvest with that of ungraded apples, it was found that with graded McIntosh apples the wastage in early March was 14.9% and with ungraded only 4.1%. These losses were largely due to rots and visible breakdown. It is concluded that grading accounts for more bruising than picking or other handling operations at harvest. Visible breakdown did not become apparent until February. With Cortland apples bruising was not sufficiently severe to necessitate rejection of any of the apples, but the ill effects of grading were apparent in a large increase in rots and a slight increase in breakdown. In controlled bruising studies it was found that bruising by impact caused more breakdown than bruising by pressure. The longer

the apples were held in store, the more their susceptibility to bruising increased, but it appeared that severe bruising early in storage was likely to cause more breakdown than slight bruising late in storage.—Hort. Div., Ottawa.

2654. WALKER, W. F.

Apple boxes constructed with pressed hard-board.

Tasm. J. Agric., 1953, 24: 11-13.

An experimental shipment of apples in specially constructed standard and dump cases using pressed hard-board in varying combinations with timber led to the conclusion that hardboard in its present form is unsuitable for apple boxes.

2655. STANFORD RESEARCH INSTITUTE.

Transportation and handling costs of selected fresh fruits and vegetables in the San Francisco Bay terminal market area.

Market. Res. Rep., U.S. Dep. Agric. Bur. agric. Econ. 2, 1952, pp. 65, 35 cents.

This is one of a number of studies carried out under the Agricultural Marketing Act of 1946 programme designed to increase efficiency of marketing farm products. It deals with factors responsible for costs in transporting and handling fruit and vegetables in terminal markets in Oakland and San Francisco, where two substantially different methods of operation are involved. Suggestions are made for methods of improving transporting and handling practices in these and other cities. Specific commodities included in this study are apples, lettuce, oranges, peaches, potatoes and tomatoes.

2656. SCOTT, R. C., AND LEED, T. W.

Marketing apples through retail stores in Cleveland and the Canton-Youngstown area.

Res. Bull. Ohio agric. Exp. Stat. 719, 1953, pp. 31, bibl. 4.

This study was carried out to determine what improvements could be made in the marketing of Ohio apples. The following recommendations are made. (1) Selection of better types of container. (2) Selection of varieties and adoption of practices which produce apples of better colour. (3) Greater uniformity of packs. (4) Better handling and storage of apples in the retail stores, together with marking the displays to indicate varieties or what they are used for and price.

2657. SCHWARZENBACH, W.

Entsteinte Kirschen. (Stoned cherries.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 107-13, illus.

In 1951 and 1952 the Swiss market for fresh cherries was increased by selling stoned, stalkless fruit of first grade quality in 5 kg. containers or milk churns. A machine for stoning cherries with a performance of 900-1,000 kg. per hour is illustrated.

2658. PAQUET, A.

L'utilisation des sous-produits de la distillerie de fruits. (Utilization of the by-products of fruit distillation.)

Fruit belge, 1953, 21: 49-54.

The pomaces derived from cider-making and fruit-distilling have only a limited value as fodder in the fresh state but they can be ensilaged or used as fertilizer,

and they can be dried. Dried pomace is an excellent carrier for molasses and can be used in the manufacture of pectins or as fodder.

2659. WHITTAKER, E. C.

Fruit packing equipment.

Agric. Gaz. N.S.W., 1952, 63: 577-82, 635-8, and 1953, 64: 17-20, 74-7, illus.

Notes are given on pome, stone and citrus fruit packing sheds and equipment. Items of equipment discussed include fruit sizing machines, springboards—for packers to stand on—packing benches, lidding presses, wrapping paper holders, gravity conveyors, case wiring machines, trucks, nail strippers, mechanical loaders and case-making moulds.

Storage.

(See also 2501, 2502, 2516k, 2672a, c, k.)

2660. PHILLIPS, W. R., AND POAPST, P. A.

Storage of apples.

Publ. Canada Dep. Agric. 776, revised 1952, pp. 43, illus.

This revised publication covers the same ground as that of 1946 [see *H.A.*, 16: 1647] but there is a new section on storage management and more information is given on cooling equipment and storage disorders. Notes on the cold and gas storage of 19 varieties cover temperature, relative humidity, atmosphere, storage life, and storage disorders and their control.

2661. VAN DOREN, A.

The storage of Golden Delicious and Red Delicious apples in modified atmospheres.

Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 91-5.

A discussion on gas storage, particularly refrigerated gas storage, with notes on the construction of store rooms, use of atmospheric washers and refrigeration equipment. Golden Delicious and Red Delicious apples responded best and were kept longest with oxygen at 2%, carbon dioxide less than 0.05% and temperature 31° F.

2662. SMOCK, R. M.

The influence of various temperatures during controlled atmosphere storage of McIntosh apples.

Proc. Amer. Soc. hort. Sci., 1952, 60: 221-5, bibl. 2.

In storage tests in 4 seasons at Cornell University McIntosh apples were held at various temperatures ranging from 32° to 40° F. and at temperatures that were dropped gradually from 38° F. to 32°-34° F. In air results were generally poor. In controlled atmospheres, most commonly consisting of 5% CO₂ and 3% O₂, results were variable. Gradually reducing the temperature from 38° F. in controlled atmospheres was not always successful; although fruit softening was usually retarded, flesh damage and off-flavours sometimes developed. Among constant temperatures in gas storage 38° F. was the most satisfactory, and it seems possible that McIntosh apples could be held at this temperature for 4 months before the temperature drop was started.

2663. TROUT, S. A., HALL, E. G., AND SYKES, S. M.

Effects of skin coatings on the behaviour of apples in storage. I. Physiological and general investigations.

Aust. J. agric. Res., 1953, 4: 57-81, bibl. 38.

The effects of skin coatings, including solutions of castor oil and of shellac in alcohol, mixtures of these, and aqueous solutions of various mineral and vegetable waxes and oils, on the physiological behaviour of apples have been investigated and a mechanism for the effects has been suggested. Using mainly the variety Granny Smith, the composition of the internal atmosphere, respiration rate, and other changes associated with ripening have been studied in both uncoated and coated apples. The effects were found to depend greatly on temperature, thickness and type of coating, and variety and condition of the fruits. Coating increased the resistance of the skin to gaseous diffusion and thus greatly reduced the internal oxygen concentration, increased the internal carbon dioxide concentration, reduced the respiration rate, and retarded ripening changes by varying degrees. The most spectacular effect on ripening was a marked retardation of normal yellowing of the skin, which is mainly controlled by internal oxygen supply. [Authors' summary.]

2664. ALLENTOFF, N., PHILLIPS, W. R., AND JOHNSTON, F. B.

Carbon dioxide fixation in the detached McIntosh apple.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 6, bibl. 11, illus.

CO₂ fixation takes place at an appreciable rate in the mature McIntosh apple throughout its storage life. Approximately 50% of the CO₂ fixed is incorporated in the malic acid. The rate of fixation of CO₂ as malic acid by a given weight of apple is not proportional to the concentration of malic acid present, unlike the rate of disappearance of the acid. The rate of fixation of CO₂ as malic acid appears to follow the respiration rate, especially in showing a peak at the time of the respiratory peak. An attempt has been made to correlate the course of variation of observed R.Q. values with the course of CO₂ fixation. [From authors' summary.]—Hort. Div., Ottawa.

2665. PORRITT, S. W.

Production of carbon dioxide by apple tissue.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 17, bibl. 35.

In a fundamental study of the respiratory mechanism of stored fruit, the effects were studied of certain respiration inhibitors and acid intermediates of the Krebs cycle on Newtown apple tissue slices. Cutting the fruit resulted not only in an increased respiration rate but also in considerable increase in respiratory quotient. It was found that most of the acids of the Krebs cycle participated in CO₂ production, but the results did not necessarily demonstrate an organization such as the Krebs cycle. Respiration rate of young apples, 3 weeks from bloom, was almost 10 times that of mature tissue. The pronounced increase in respiration rate which accompanied sectioning of mature fruits did not occur with small, immature fruits. Respiratory inhibitors, in the concentrations used on mature tissue, had little

effect on immature tissue.—Exp. Stat., Summerland, B.C.

2666. PHILLIPS, W. R., AND OTHERS.
Volatile studies.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 15, bibl. 3.

In tests to determine whether the storage life of apples could be prolonged by the use of charcoal filters in the store, it was found that such filters were only effective when the charcoal was reactivated daily. As most of the loss during storage was due to fungal rots it is thought that their beneficial effect might be due to the removal of fungal spores during reactivation. It was also noticed that apples in the reactivated charcoal stores had consistently less red colour than those in the continuous charcoal or control stores. No evidence was obtained that charcoal filters absorbed ethylene. The typical pectin trend was improved by changing the charcoal filter daily but appeared to be affected most beneficially by rapid air circulation. The use of a mineral oil spray, Bayol D, replacing the brine, to absorb volatiles, resulted in serious damage to the fruit.—Hort. Div., Ottawa.

2667. FISHER, D. V., AND PORRITT, S. W.

Air purification by means of carbon filters for prolonging storage life of apples.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 5.

Tests were carried out at the Experimental Station, Summerland, B.C., on the effect of carbon air filters on the quality of 7 varieties of apple stored at 35° F. for 6 weeks and at 31° F. for the remainder of the storage period. The carbon air purification had no effect on firmness, soluble pectin formation, appearance or flavour.

2668. PHILLIPS, W. R.

Smithfield storage.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 6.

Observations are recorded on the efficiency of the forced air circulation unit used at the Smithfield Substation for pre-cooling and storage of apples. The equipment consisted of a floor-mounted blower coil unit of rated capacity of 5,600 Btu. per hr in a chamber 35×20 ft. The mean cooling time required to bring apples from 68° to 40° F. was 75.1 hrs compared with 240 hrs in stores having only convection air currents.

2669. ROSTOS, G. M., AND HICKS, E. W.

Some observations on the design of cool stores.
Reprinted from *Refrigeration J.*, 1952, Vol. 6, No. 3, pp. 8, bibl. 6.

From surveys made by the C.S.I.R.O., Division of Food Preservation, on the performance of a number of cool stores of various designs, observations are made on temperature distribution in the steady state, the cooling of goods to the storage temperature, and evaporation from stored goods.

2670. NICOLAISEN-SCUPIN, L.

Über das Verhalten früher und mittel-früher Birnensorten bei der Kaltlagerung. (On the behaviour of early and medium-early pear varieties in cold storage.)

Verlag F. C. Müller, Karlsruhe, 1952, from review in *Mitt. Klosterneuburg*, 1953, 3: 122.

Storage trials were carried out with the following six pear varieties: Clapp's Favourite, Beurré Amanlis, Louise Bonne de Jersey, Bartlett, Beurré Hardy, and Duchesse d'Angoulême.

2671. CLAYPOOL, L. L., AND OZBEC, S.

Some influences of temperature and carbon dioxide on the respiration and storage life of the Mission fig.

Proc. Amer. Soc. hort. Sci., 1952, 60: 226-30, bibl. 6.

Trials over 3 seasons indicate that the storage life of the Mission fig can be greatly extended by reducing the temperature to about 37-40° F. At lowered temperatures mould growth and respiration rates were much reduced. There was no indication of the development of a climacteric peak of respiration usually found with fruits. Storage in atmospheres varying in CO₂ content from 0 to 60% at 68° F. seemed of little value, but an initial exposure to 100% CO₂ for 36 hrs at 41° and 50° F. seemed to reduce the subsequent respiration rate and to delay the growth of micro-organisms.

Noted.

2672.

a GERWE, R. D., AND SLADE, M. A., Jr.
Peach processing for fresh market.

Proc. 94th annu. Mtg Pa St. hort. Ass., 1953, 32: 27-31, bibl. 1.

By the Stericooler and Sta-Fresh wax coating.

b GRANHALL, I.

Mutationsförändring av fruktträd. (Induced mutations in top fruit breeding.)

Reprinted from *Nordisk Jordbruksforsk.*, 1951, pp. 401-11, bibl. 28 [received 1953]. A review and discussion of future possibilities.

c DE HAAN, I.

The ripening process and development of woolliness in peaches.

Fmg S. Afr., 1953, 28: 58-60, 67, bibl. 16. A review of the literature on ripening and storage.

d HOPE, G. W.

Variety canning tests of fruits and vegetables.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 2.

Pears, raspberries and strawberries.

e KRÜSSMANN, [G.].

Untersuchungen an Kirschensorten in Holland, Belgien und Deutschland. (Investigations on cherry varieties in Holland, Belgium and Germany.)

Dtsch. Baumsch., 1953, 5: 40-3.

f MACARTHUR, M.

Morphology of apple bruises.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, 1 p.

g MATSUI, S., ITŌ, S., AND MURATA, N.

Studies on canning qualities of Bartlett pears from the different growing districts in Japan. [Japanese, with English summary 1 p.]

Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat., 1952, No. 1, pp. 212-24, bibl. 10, illus.

h METLICKI^{II}, Z. A.
Fundamental problems of quince cultivation.
[Russian.]
Sad i Ogorod, 1953, No. 1, pp. 32-5.
In the U.S.S.R.

i OBERLE, G. D., AND MOORE, R. C.
Two new varieties of nectarines for Virginia.
Fruit. Var. hort. Dig., 1952, 7: 20-2.
Redchief and Cavalier.

j REINECKE, V.
Budding deciduous fruit trees and stocks.
Fmg S. Afr., 1953, 28: 53-4, illus.

k ROBERTSON, R. N.
The cooling of fruit. I. Fruits as living organisms.
HALL, E. G.
The cooling of fruit. II. Fruit in the cool store.
ROSTOS, G. M.
The cooling of fruit. III. The control of storage conditions.
Reprinted from *Refrigeration J.*, 1952, Vol. 5, Nos. 9 and 10, pp. 3, 7 and 4 respectively.

l SCHNEIDER, G. W.
Megagametogenesis and embryology in a diploid and an aneuploid apple.
Amer. J. Bot., 1953, 40: 196-203, bibl. 24, illus.

m SOUTY, J.
Les porte-greffes du pêcher et du prunier.
(Rootstocks for peach and plum.)
Courr. hort., 1953, 15: 98-102.
For very similar paper see *H.A.*, 20: 1315.

n SPANGELO, L. P., AND POAPST, P. A.
An evaluation of the keeping quality of six [five] apple varieties.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 2.
Bancroft, Lawfam, 0-2016, Spartan and Toshkee.

o THOMAS, P. H.
Apple varieties raised in Tasmania. 7. Legana.
Tasm. J. Agric., 1953, 24: 8-10, illus.
Legana, a Democrat \times Delicious cross, is a very late keeper.

p THORNE, D. W.
The soil side of fruit growing.
Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 41-6.

q TUKEY, L. D.
The status of chemical thinning of fruit.
Proc. 94th annu. Mtg Pa St. hort. Ass., 1953, 32: 67-72, bibl. 6, being *Pap. J. ser. Pa Exp. Stat.* 1781.
A discussion and review of most recent literature.

r TUKEY, R. B.
Rootstocks for fruit trees.
Amer. Fruit Gr., 1953, 73 (3): 15, 46-7, illus.
American situation.

s WILLIAMS, B. L., AND WENDER, S. H.
Isolation and identification of quercetin and isoquercitrin from apricots (*Prunus armeniaca*).
Arch. Biochem. Biophys., 1953, 43: 319-23, bibl. 8.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(See also 2408, 2409, 2438, 2501, 2518, 2519, 2533, 2543, 2623, 2647, 2756a-h, j, l, o, p, 3004, 3008, 3153, 3196d, 3391, 3630, 3638, 3663.)

2673. HADERMANN, G.

La culture des espèces fruitières à petits fruits. (Small fruit growing [in Antwerp Province].) [English summary 8 lines.]

Rev. Agric. Brux., 1953, 6: 318-39, bibl. 3.

The small fruit industry in the Province of Antwerp is reviewed. Notes are included on the best or most common dessert and processing varieties of strawberry, raspberry, gooseberry, red currant and black currant at present in use.

2674. NOHE, E.

Zur Samengewinnung von Beerenfrüchten bei Züchtungsarbeiten. (The extraction of seed from berry fruits for breeding.)

Saatgut-Wirtsch., 1953, 5: 36-7, illus.

The following procedure is recommended after extracting seed from berries, tomatoes and cucumbers available in small quantities: The seeds are spread on strips of filter or other paper and left to dry until they stick. The strips are then hung up for further drying. If a

paper is used that rots easily, such as newspaper, it is placed in a seed box with the seed on it and covered with 0.5-1 cm. compost soil. Seed prepared in this manner has a different colour from that extracted by fermentation, but germination is not affected. On the contrary, it may be an advantage to retain the mucous layer which absorbs water on moistening.

2675. DIXON, E.

Variety trials—black currants.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, 1 p.

The 3 rust-resistant varieties Crusader, Consort, and Coronet produced very good jellies, equal in flavour to those of the accepted varieties, Kerry and Magnus.

2676. MODLIBOWSKA, I., AND RUXTON, J. P.

Preliminary studies of spring frost resistance of black currant varieties.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 67-72, bibl. 12.

From the results of a series of 7 laboratory experiments, involving racemes or pot plants of 10 varieties subjected to low temperatures, and from records of damage to 9 varieties in the field following a grass temperature minimum of 25° F. on 21/22 April, 1951, it is concluded that none of the varieties tested showed marked

resistance to frost, but that some, notably Seabrook's Black, tended to suffer less damage than others. In the laboratory tests buds at the "grape" stage suffered more damage than open flowers.

2677. ELLENGORN, J. E., AND ŽIRONKIN, I. M. The multiplication and ontogenesis of the nuclei in the process of the development of roots from lenticels on stems of black currant and willow. [Russian.]

Izv. Akad. Nauk S.S.R. Ser. Biol., 1951, No. 5, pp. 5-45, bibl. 9, illus.

If cuttings of black currant or willow are immersed in water, roots grow out from some of the lenticels. Such roots arise from actively dividing cells of the tissues immediately below the lenticels. These cells are non-nucleate and so multiply amitotically by fission. As the root initials develop, protokaryons arise in the cells.

2678. STUKKEI, K. L.

Volatile phytoncides and essential oils [in black currants]. [Russian.]

Priroda, 1951, 40 (12): 46.

Black currant leaves when injured are said to emit a toxic "phytoncide", and the question arises whether this is the same as the essential oil given off from the glands on the underside of the leaves. Glands were carefully removed from leaves and tested for the toxic substance, with negative results, from which it was concluded that in black currant leaves the phytoncide is not part of the essential oil.

2679. DARROW, G. M., DEMAREE, J. B., AND TOMLINSON, W. E., Jr.

Blueberry growing.

Fmrs' Bull. U.S. Dep. Agric. 1951, revised 1952, pp. 53, illus.

This bulletin was first issued in 1944 and in a slightly revised form again in 1950 [see *H.A.*, 23: 293]. The sections on varieties and culture remain practically unaltered, but those on diseases and pests have been re-written by the two new co-authors.

2680. MEADER, E. M.

Accelerated increase of high-bush blueberry by forced softwood cuttings.

Proc. Amer. Soc. hort. Sci., 1952, 60: 97-100, bibl. 4, being *Sci. Confr. N.H. agric. Exp. Stat.* 146.

In the trial described softwood cuttings of 5 high-bush blueberry varieties rooted during the summer were induced to make much greater linear growth by forcing the plants during winter in a greenhouse kept at 70° to 80° F. by day and at about 60° F. by night and with artificial light provided to give a photoperiod of 15.5 hrs. This increased growth was in turn used to provide more cuttings which rooted readily without the aid of growth substances.

2681. CHILDS, W. H.

Further studies of greenhouse fertilization of blueberry hybrids grown in shredded sphagnum.

Proc. Amer. Soc. hort. Sci., 1952, 60: 141-5, bibl. 6, being *Sci. Pap. W. Va agric. Exp. Stat.* 452.

In 2 successive seasons blueberry seedlings grown in shredded sphagnum moss received a nutrient solution

prepared by dissolving 1 lb. 4-12-4 fertilizer in 8 gal. tap water at the rate of 1 gal. to 133 plants. In 1950 applications were repeated 3 to 9 times and in 1951 1 to 4 times. There were no distinct differences in linear growth, and the single application resulted in the lowest mortality. [For an earlier study see *H.A.*, 21: 2378.]

2682. BANTA, E. S.

Hoosier blueberry king.

Amer. Fruit Gr., 1953, 73 (4): 17, illus.

A hydraulic blueberry hoe is described and illustrated. It could be used also in vineyards and orchards.

2683. STEVENS, N. E.

Acidity of soil and water used in cranberry culture.

Trans. Wis. Acad. Sci., 1951, 40: 211-14, from abstr. in *Biol. Abstr. Sect. D*, 1953, 27, No. 7565.

The pH of cranberry soils in Wisconsin ranges from 3.6 to 6.8, and that of water used in flooding from 5.0 to 8.3. 90% of New Jersey cranberry soils have a pH between 4.0 and 5.0; pH of water used for flooding is very uniform at about 4.5. In Massachusetts most of the water used for flooding has a pH below 7.0 and a bound CO₂ content below 5 p.p.m.

2684. JOHANSSON, E., AND BERGELIN, E.

Sortförsök med krusbär. (Gooseberry variety trials.) [English summary 1 p.]

Medd. Trädgårdsförs. Malmö 77, 1953, pp. 20, bibl. 8, illus.

Trials were carried out with 43 varieties of gooseberry in various parts of Sweden from 1942 to 1951. The hardiest were American mountain gooseberry, Champion, Scania, Triumphant and Industry; Whitesmith was fairly hardy; White Lion, Warrington and Early Sulphur appeared to be the least hardy. At Tosemarken on the west coast north of Gothenburg, Smiling Mary, Thrasher White and Whitesmith cropped the best; among red varieties Achilles yielded well at most places; Scania and Whitesmith appeared to be the highest yielders among good-flavoured hardy varieties. The most suitable varieties for western, central and southern Sweden appeared to be: *yellow or green-yellow*: Whitesmith, Thrasher White, Leveller, Broom Girl, Lancer, Smiling Mary and Hönings Früheste; *green*: Champagne Green; *red*: Achilles, Warrington, Whinham's Industry, London, and Waterloo. Varieties recommended for northern Sweden and other places where hardiness is required are: *yellow or green-yellow*: Dr Törmarck, Whitesmith, and Champion; *red*: Scania and Whinham's Industry.

2685. ICE, C. H., AND WENDER, S. H.

Quercetin and its glycosides in leaves of *Vaccinium myrtillus*.

J. Amer. chem. Soc., 1953, 75: 50-2, bibl. 10.

This paper reports details of the isolation in pure form of quercetin (3,3',4',5,7-pentahydroxyflavone) and five of its glycosides from the leaves of the "huckleberry", *Vaccinium myrtillus*. The glycosides have been identified as quercetin-3-arabinoside, isoquercitrin (quercetin-3-glucoside); quercitrin (quercetin-3-rhamnoside); quercetin-3-glucoside; and apparently a new quercetin rhamnoside not identical with quercitrin. [Authors' abstract.]

2686. VAN OOSTEN, A., AND OOLE, L. C.

Zeeuwse ervaringen met Malling Promise.
(Experiences with Malling Promise in
Zeeland.)

Fruitteelt, 1953, 43: 416-17.

Compared with the standard Zeeland raspberry varieties Preussen and Hornet, Malling Promise has generally given higher yields, shown less susceptibility to stem diseases, and the fruit has fetched higher prices in the market. Its disadvantages were that it suckered badly, was very liable to chlorosis on chalky soil, the fruit ripened unevenly and did not travel well. In the spring of 1953, following a very wet autumn, this variety suffered exceptionally heavy losses from a collar rot which in some cases caused the death of both stems and roots. The trouble was serious in more than half of the Malling Promise plantations in Zeeland, and was most severe on wet, badly drained soil. Other varieties were not affected. It is thought that excessive sulphate reduction and increased fusarium infection, both typical of waterlogged soils, may be secondary causes of the trouble. It is concluded that Malling Promise must be planted on well-drained soil that is not too chalky.

2687. MICHIGAN AGRICULTURAL EXPERIMENT STATION.

New raspberry introduced.

65th A.R. Mich. agric. Exp. Stat. 1951/52,
1952, pp. 93-4.

The new raspberry variety Early Red, developed at the South Haven Experiment Station, combines earliness, hardiness and high productivity with a long ripening season. It has a good flavour and should be a popular variety for home gardens.

2688. BOIS, E.

Le framboisier Romy. (The raspberry variety Romy.)

Rev. hort. Suisse, 1953, 26: 68-70, illus.

An account is given of this new Swiss raspberry variety that fruits in mid-June and again from the end of August until November. The average yield is 3-5 kg. per sq. m., the fruit will stand a temperature of -3° C., and the canes are stiff enough to make wiring unnecessary.

2689. WILSON, D. J.

Notes on some strawberry varieties.

A.R. East Malling Res. Stat. for 1952, 1953,
A36, pp. 176-8.

Notes are given on yields, fruit quality and other characters of the following strawberries under trial at East Malling: Huxley M.44, Madame Lefebvre M.49, Perle de Prague M.45, Early Cambridge S.230, Jucunda S.241, Royal Sovereign M.40 and M.48, Bradley Cross S.55, and Auchincruive Climax M.46.

2690. STRAUSS, E.

Neue Erdbeersorten. (New strawberry varieties.) [English summary 3 lines.]

Mitt. Klosterneuburg, 1953, 3: 115-18.

The merits are discussed of the following five new strawberry varieties which were tested at Klosterneuburg: Regina and Macherauchs Frühernte, both from the Erwin Baur (now Max Planck) Institute; Georg Soltwedel, from a plantation at Lüneburg, Germany;

Ydun, from Denmark, and Wädenswil 4. [See also *H.A.*, 23: 307.]

2691. COLBY, A. S., AND BOLL, H. L.

Plentiful, a new strawberry variety.
Fruit Var. hort. Dig., 1953, 7: 47.

The variety Plentiful (Redstar \times Pathfinder), released by the Illinois Agricultural Experiment Station early in 1953, is a good producer of both fruit and runners. No red stele root rot has been found on the roots of plants growing on sites infested with this disease, and the foliage is resistant to leaf spot and leaf scorch.

2692. HEIN, G.

Afwijkingen in de bloemontwikkeling van
de aardbei na kortedagbehandeling. (Abnor-
malities in the flower development of
strawberries resulting from short-day treat-
ment.) [English summary 7 lines.]

Meded. Dir. Tuinb., 1953, 16: 269-71, bibl. 1.

Deutsch Evern strawberries given short-day treatment were induced to crop 3 times in the same year. During the first and second harvest the plants were given long nights, from 5.30 p.m. to 7.30 a.m. for 3 weeks. As a result of this treatment they flowered profusely but many of the flowers had small petals and no stamens.

2693. GOEDEWAAGEN, M. A. J.

Grondwaterstand en beworteling der gewas-
sen. (Root development of crops in relation
to the depth of the water table.) [English and
French summaries 1 $\frac{1}{2}$ p. each.]

Versl. Techn. Bijeenk., Commiss. hydr.
Onderz., T.N.O., 1-6, 1952, pp. 65-82
[summaries pp. 285-6, 314-15], bibl. 2, illus.

Strawberries and field crops were used in these studies. The conditions that might hamper depth of root development and so cause drought injury are reviewed, and the different capacity of various crops for overcoming mechanical resistance in the soil is demonstrated. Experiments with strawberries have shown the importance of an open capillary zone in the soil for the growth and water absorption of the plants, because the roots could not penetrate the soil water or the saturated capillary zone above it. Observations on commercial strawberry crops showed that drought injury occurred where root development was poor as a result of disease, fluctuating water table or wind damage. Evidence is presented to show that poor growth where the water table is high is due largely to a reduced absorption of nitrogen and other nutrients.

2694. ARNEY, S. E.

Studies in growth and development in the
genus *Fragaria*. I. Factors affecting the rate
of leaf production in Royal Sovereign
strawberry.

J. hort. Sci., 1953, 28: 73-84, bibl. 10.

Records of the time of emergence of successive leaves on Royal Sovereign strawberry plants over a number of years show that the rate of leaf production is low in February, March and April, and in October and November, and reaches a maximum value of one leaf every 8 to 10 days during June, July and August. The leaf production rate of plants grown in a heated greenhouse is significantly greater than the rate for

outside plants, but only between February and May. Leaf production rate is correlated with air temperature, but not with total monthly rainfall or mean daily hours of bright sunlight. Mean air temperatures below 41° F. stop the emergence of leaves almost completely. Rainfall is only important after abnormally dry conditions which markedly reduce the rate of leaf formation. The dry summer of 1940 slowed the rate of leaf production appreciably. Watering after drought brings about recovery within a few days. Disturbance of the root systems by transplanting can also reduce the rate of leaf formation; young runners recover within a month, but older plants may remain sensitive to dry conditions for a whole season afterwards. For the first 7 years' growth no effect of age on rate of leaf production could be established. The production of runners does not alter the rate of leaf formation of the parent plant, but the development of secondary crowns causes a small reduction in rate of leaf production *per crown*. There appears to be a characteristic irregularity in the emergence of the first few leaves on the runner, with a long interval between the third and fourth leaves, but there is otherwise very little difference between the rate of leaf production of the parent and that of the runner during each month. [Author's summary.]—Univ. Coll., Cardiff.

2695. MONZINI, A.

La tachipessi applicata alla conservazione delle fragole. (The quick freezing of strawberries.) [English summary 13 lines.]

Ann. Sper. agrar., 1953, 7: 89-95, bibl. 5.

In preservation tests at Milan Refrigeration Experimental Station strawberries (hybrids between *Fragaria chiloensis*, *F. virginiana* and *F. elatior*) were subjected to treatment either immediately after harvesting or after 48 hours. Six treatments were applied: (1) 500 c.c. water, 500 g. sucrose; (2) water, sucrose and 6 g. l-ascorbic acid; (3) water, sucrose and 6.85 g. 2-keto-l-gulonic acid; (4) 500 c.c. lime juice, 500 g. sucrose; (5) 700 c.c. marsala, 300 g. sucrose; and (6) control (no treatment). The fruit was frozen at -40° C. and then stored at -20° C., some for 75 and some for 195 days. Syrup (3) was the best, followed by syrup (2). With the former, colour, aroma and taste were very well retained but with the latter the aroma was somewhat affected. The loss of water on thawing was greater in fruit frozen 2 days after harvesting than in fruit frozen immediately.

Vines.

(See also 2518, 2595, 2620, 2650, 2756i, k, n, 3421, 3509, 3510, 3652, 3676.)

2696. DEPARDON, L.

Le vignoble et le vin de Bourgueil. (The vineyards and wine of Bourgueil.)

Ann. agron. Sér. A, 1952, 3: 953-62, bibl. 1, illus.

Notes are given on the vineyards and wine of Bourgueil in Touraine, on their climate, geography, geology and soils, and on the variety and method of training. The only variety of which the cultivation is permitted in the Bourgueil area is the Cabernet franc, locally called Breton. The chief rootstocks used on different soils are named.

2697. DEPARDON, L., AND BURON, P.

Le vignoble et le vin de Vouvray. (The vineyards and wine of Vouvray.)

Ann. agron. Sér. A, 1952, 3: 807-17, illus.

Notes are given on the history and importance of the Vouvray vineyards in Touraine, on their climate and soils, on the varieties cultivated and the method of training. The only varieties of which cultivation is permitted in the area are the large Pineau (or Pineau de la Loire or Chenin Blanc) and the small or Menu Pineau. The chief rootstocks are Riparia-Gloire, Riparia Rupestris 3309 and Chasselas Berlandieri 41 B.

2698. BERNARDELLI, O.

Problemi tecnico-economici della viticoltura Valtellinese. (Technical and economic problems of vine growing in Valtellina.)

Atti. Accad. ital. Vite, 1951 [issued 1952], 3: 82-93, illus.

This paper includes notes on vine growing for wine production in Valtellina. The principal vine is Chiavennasca, an old local variety of Nebbiolo, Rossola, Pignola and Brugnola being planted on a small scale. The chief rootstocks used are Berlandieri \times Riparia 420/A and Riparia \times Rupestris 3309. The classic planting density is 4,000 per ha. A modified Guyot system of training is employed.

2699. BRADT, O. A.

The grape in Ontario.

Bull. Vineland hort. Exp. Stat. 487, 1952, pp. 38, illus.

Notes are given on grape growing in Ontario. Varieties recommended for general planting are Fredonia, Ontario (dessert), Delaware (wine and dessert), Niagara (wine and dessert), Agawam (wine), Concord (wine and dessert).

2700. LUQUE, J. A.

Biología de la vid en la zona sud de Cuyo. (Biology of the grape vine in the southern part of Cuyo.)

Bol. Prod. Fom. agric. B. Aires, 1951, 3 (20): 2-7, from abstr. in *Biol. Abstr., Sect. D*, 1953, 27, No. 10736.

The average annual growth cycle of the grape vine in this section of Argentina extends from about 5 October to about 22 March. High winds and excessive dryness or humidity during the blossoming period reduce fruit set. Delayed pruning results in loss of sap from cut surfaces that may retard plant development 7 to 10 days. Sap flowing from pruning wounds contained about 2 g. of solids per l. of which 65% was organic and 35% inorganic matter. Dusting with lime and sulphur just before the blossoms opened gave a better fruit set in certain varieties.

2701. BADELL ROIG, L.

Vides europeas. Contribución al estudio de las sinonimias. (European vines. A contribution to the study of synonymy.)

An. Esc. Perit. agric. Barcelona, 1952, 11: 89-232.

An alphabetical list is given of over 4,000 names of European vine varieties, giving the synonyms used in various countries or districts.

2702. SNYDER, E., AND HARMON, F. N.

Grape breeding summary 1923-1951.

Proc. Amer. Soc. hort. Sci., 1952, 60: 243-6, bibl. 9.

The main object and achievements of the programme in California for raising new table grapes and vine rootstocks are outlined. Among the former, 3 varieties, Cardinal, Calmeria and Blackrose have reached the stage of commercial production. Among rootstocks particular attention has been paid to resistance to rootknot nematode (*Meloidogyne* spp.). [See also *H.A.*, 22: 1279.]

2703. STONER, W. N., AND STOVER, L. H.

Some field observations on Florida experiment station hybrid grapes.

Proc. Fla St. hort. Soc. for 1952, pp. 193-6, bibl. 4, illus.

A progress report is given on the field behaviour of some of the Pixiola \times Golden Muscat hybrid grapes bred at the Watermelon and Grape Laboratory, Leesburg, for resistance to degeneration, possibly caused by Pierce's disease. The vines were planted in areas where degeneration had previously made grape culture impossible. None of those examined showed definite symptoms of degeneration, whereas the control varieties were dead or dying. One of these new hybrids, named Lake Emerald, is being increased for distribution. [See also *H.A.*, 23: 317 and 318.]

2704. STOUT, A. B.

New seedless grapes.

Gdn J. N. Y. bot Gdn, 1953, 3: 56, illus.

A description is given of two seedless grape varieties named Himrod and Romulus that are being distributed by the New York State Agricultural Experiment Station for general culture. They were obtained in a co-operative breeding project between the New York Botanical Garden and the Experiment Station and are sister seedlings derived in 1928 from a cross between the hardy, early Ontario seeded grape and the Sultanina or Thompson Seedless grape. They are much hardier than Sultanina, ripen in early and mid-September respectively, and are suitable for the grape-growing areas of New York.

2705. DEPARDON, L., BURON, P., AND MAUVISEAU, —.

Contribution à l'étude des hybrides producteurs de vigne. (Contribution to the study of hybrid vines.)

Ann. agron. Sér. A, 1952, 3: 696-7.

A study was made at Blois of fairly recently bred hybrid vines, the quality of whose wines is not yet fully known. *Late maturation*: Seyve-Villard 18-315 and 23-657, and Seibel 14,596 fail to mature their grapes fully. *Resistance to downy mildew*: Among early red wine varieties Seibel 13,666 is resistant; it yields well, holds its berries and gives good quality wine, but owing to lack of vigour it generally requires grafting: Teleki 5 BB and R.R. 101-14 are suitable stocks. Among white wine varieties Ravat 6 and Burdin 5201 are resistant.

2706. IVANOVA, E. B.

The muscadine grape varieties in Central Asia. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 1, pp. 36-40, illus.

The fruiting characteristics, productivity and quality of 7 varieties of muscadine grape grown in Central Asia are discussed, and 5 new useful varieties are named.

2707. MANZONI, G.

Considerazioni su differenze anatomiche in radici di barbatelle di *Vitis vinifera*, *V. riparia*, *V. rupestris*, e *V. berlandieri*. (A consideration of the anatomical differences in the roots of *Vitis vinifera*, *V. riparia*, *V. rupestris* and *V. berlandieri*.) [English summary 11 lines.]*Ann. Sper. agrar.*, 1953, 7: 299-337, illus.

A study of the anatomical characters of the roots of one-year-old rooted cuttings of *Vitis vinifera*, *V. riparia*, *V. rupestris* and *V. berlandieri* is described. It is concluded that there are sufficient differences to permit of the differentiation of the four varieties in winter. The diagnostic characters are given.—Staz. sper. Vitic. Conegliano.

2708. VIDAL-BARRAQUER MARFÁ, J. M.

Los portainjertos en el viñedo. (Vine rootstocks.)

An. Esc. Perit. agric. Barcelona, 1952, 11: 3-72, illus.

A survey is given of present knowledge on American rootstocks, their value, origin, nomenclature and cultural characters, with special reference to their use under Spanish conditions. An identification key is given and illustrations are provided of 15 American stocks.

2709. JÖHNSSEN, A.

Sélection et conditions de livraison de vignes porte-greffes. Rapport général. (Selection and conditions of issue of vine rootstocks. General report.)

Bull. Off. int. Vin, 1953, No. 264, pp. 27-41.

This general report is the first of a series on the same subject read at the 32nd official plenary session of the committee of the Office International du Vin at Fribourg in August, 1952. *Selection*. Mass selection is much commoner than clonal selection and consists much more of the negative process of eliminating inferior plants than of the positive process of selecting superior ones. The importance of adaptation, affinity and freedom from virus disease is discussed. *Conditions of issue*. Subjects discussed are ripeness, damage (hail, friction, defoliation scars, development of dormant buds, frost, etc.), importance of absence of insect and fungal pests and viruses, diameter and length of rootstocks, packing, date of issue, receipt, payment, and compensation.

2710. ANON.

Sélection et conditions de livraison de vignes porte-greffes (Algérie). (Selection and conditions of issue of vine rootstocks [in Algeria].)

Bull. Off. int. Vin, 1953, No. 265, pp. 37-42.

Selection. Except for those in sandy coastal areas and the inland plains of Mercier-Lacombe and Palikao all vines in Algeria are grafted on phylloxera-resistant rootstocks. A negative mass selection is practised by the elimination of undesirable plants in mother plantations. Clonal selection is conducted to obtain hardy varieties adapted to the dry conditions and calcareous

soils of Algeria. V.15, a Berlandieri \times Rupestris hybrid, is the most important rootstock; a Berlandieri and 2 Rupestris IAA stocks are among the best, but are still in the experimental stage. *Issue of rootstocks.* Mother vines can only be raised in the coastal areas; growth of wood in Rupestris du Lot and Riparia \times Rupestris is generally inferior, and in 41 B and most Berlandieri hybrids superior to that obtained in France. Notes are given on spacing, training, cultural technique, dimensions, packing, storage, etc. [See abstract 2709 for general report on this subject.]

2711. ANON.

Sélection et conditions de livraison de vignes porte-greffes. (Autriche.) (Selection and conditions of issue of vine rootstocks [in Austria].)

Bull. Off. int. Vin, 1953, No. 265, pp. 42-4.

Selection. In recent years affinity tests have been conducted with the following rootstock varieties: 5BB, S04, 125AA, 5C, 1D, 8B, 18B, R7, R27, 59B, and 26G. 59B shows the greatest adaptability among the Berlandieri \times Riparia hybrids examined, followed by 1D and 5BB. The Trollinger \times Riparia hybrid (26G) does not show good affinity for Grüner Veltliner, the chief variety of Lower Austria, but gives good results with Sylvaner scions. Of Berlandieri \times Riparia hybrids 8B has high resistance to lime and experience shows that this can be enhanced by applications of K salts. In Lower Austria Riparia Portalis is one of the best rootstocks since European scions grafted on it give the earliest and most reliable crops, but it can only be used on very fertile soils without too much lime. Other rootstocks are of little importance in Austria. *Conditions of issue.* Notes are included on the laws governing sales of vine material and size of rootstock cuttings.

2712. BRANAS, J., AND NESPOULOUS, J.

Sélection et conditions de livraison de vignes porte-greffes. (France.) (Selection and conditions of issue of vine rootstocks [in France].)

Bull. Off. int. Vin, 1953, No. 266, pp. 28-40.

Selection occurs in the mother-plantations and in the rootstock nurseries and is carried out from the varietal, cultural and health points of view. It consists of plot selection, mass selection and clonal selection and is both positive and negative. It is co-ordinated and regulated by the Ministry of Agriculture. The national objective is the exclusive use of clones. The official list of approved commercial rootstocks of known adaptation and affinity contains 48 varieties, of which the chief are Rupestris du Lot and 3309 C. New mother-plantations may only be established with the following rootstock varieties. These are Rupestris du Lot, 3309 C, 41B, 161-49 C, 5BB, Riparia Gloire de Montpellier, 99R, 44-53M, 110-R, 420A, 101-14 M-G, S04, Vialla, 1616 C and 333 E-M. *Conditions of issue.* Information given includes the authorized sizes of graftable cuttings (for bench grafting), nursery cuttings (for the production of rooted cuttings), and rooted cuttings.

2713. TRUEBA AGUIRRE, J., AND HIDALGO FERNÁNDEZ, L.

Sélection et conditions de livraison de vignes porte-greffes. (Espagne.) (Selection and conditions of issue of vine rootstocks [in Spain].)

Bull. Off. int. Vin, 1953, No. 266, pp. 13-28.

Selection. Rupestris du Lot, 3309 Couderc, 99 and 110 Richter, 41B Millardet, 161-49 Couderc, 420A Millardet, 31 Richter, 19617 and 6736 Castel, Teleki 5BB and 8B cover Spain's needs for the reconstruction of her vineyards. The need for the selection and multiplication of rootstock material is discussed and clonal selection at the Ampelographic and Viticultural Centre at Madrid, in particular with clones of 41B and 6736R Castel, is described. In climates with frequent rain and drops in temperature in spring, flower drop is common with some scions on the most vigorous rootstocks; this is particularly so with the Grenache común group (Cariñena, Alicante, Tinto Aragones, Tinto di Navalcarnero) on Rupestris du Lot. *Conditions of issue.* Notes are given on ripeness, injuries from various causes, the law regarding freedom from insect and fungal pests and virus, size of cuttings, packing, etc.

2714. BREIDER, H.

Aplicación de la radiografía en el estudio de la maduración de la madera y arropollado de la vid. (The use of radiographs in the study of wood maturation and court-noué of the vine.)

Bol. Inst. Invest. agron. Madrid, 1952, 12: 617-28, bibl. 5, illus.

The use of mature, healthy wood is essential in the propagation of vines. Investigations carried out at the National Institute for Viticulture, Würzburg, Germany, have shown that radiographs will indicate the state of maturity and infection by court-noué without damaging the material in any way. No cutting or staining is necessary. Work was carried out on the American Riparia-Berlandieri rootstocks 5 BB, S04 and 8 B. The results showed that the external appearance of the wood is not a reliable indication of maturity. The degree of differentiation of pith and wood, however, as revealed by X-rays, is a good guide. Shoots infected with court-noué show thin, macroscopic lignifications across the medulla. It has also been found that shoots infected with botrytis have transverse cavities across the medulla. Radiographs showing these symptoms are presented.

2715. MOROZOVA, G. S.

To reduce losses in vine rootstocks. [Russian.] *Vinodelie i Vinogradarstvo*, 1953, No. 2, pp. 46-7.

Figures obtained in a vineyard in the Ukraine show that of the 10,000 m. of wood cut from phylloxera-resistant Riparia \times Rupestris 101-14 for use as cuttings, 59.5% was lost during cleaning, sorting, cutting to the required length, storage, etc. The greatest loss, amounting to 35%, occurred in the initial selection of useful shoots, and this, it is thought, can be reduced to 14% by improving the growing conditions of the mother plants.

2716. ORLOVA, T. G.

Modified layering of vines. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 1, pp. 44-5, illus.

To replace missing plants in a row a vigorous shoot from a neighbouring vine is allowed to grow to its full length, reaching 4-5 m. or more. The following spring the branch is tied along the lowest wire and the requisite number of evenly spaced vertical shoots are grown from it. In the autumn the branch is buried 45-55 cm.

deep along the row with the tips of the vertical shoots showing, which in turn are cut back and in due course trained as individual plants. The layer is severed from the mother plant during the second year after layering but the new plants remain connected to one another underground.

2717. CAPUCCI, C.

La manualità nell'innesto legnoso-erbaceo a spacco pieno della vite. (The method of woody-herbaceous cleft grafting of vines.)

Riv. Vitic. Enol., 1953, 6: 35-40, illus.

These detailed notes on the preparation of the rootstocks, the collection, storage and forcing of the scions, and the method of grafting cover much the same ground as the first of the 3 papers on this subject [see *H.A.*, 23: 323]. The scion material is collected in February and stored in a cool sheltered place. About a fortnight before grafting, for which May is the best month in Emilia, the scions are prepared and subjected to forcing. They are placed in sand in a sunny position with the buds buried, kept damp and covered with a mat at night. After 6-15 days, when the buds have developed slightly, they are ready for use. The stock is at the correct stage of maturity when a faint ring of paler colour indicating incipient lignification surrounds the still green sappy pith. Grafting should take place either between the 3rd and 4th or between the 10th and 11th nodes; in the former case 1-3 shoots are retained, in the latter only one.—Inst. Colt. arbor., Bologna.

2718. C[OSMO], I.

La paraffinatura degli innesti al tavolo. (Paraffin-waxing bench-grafts.)

Riv. Vitic. Enol., 1953, 6: 57-8.

This is a brief review of some recent papers on the subject. Points covered are the melting point of the wax, the temperature of the wax bath and the method of applying the wax.

2719. ANON.

La vigne. (The vine.)

Rapp. Cons. Exp. Rech. agron. Algér., 1951/52, 1952, pp. 132-8.

Resistance of rootstocks to lime. Studies were conducted in the Algiers Département in 3 vineyards on shallow soils overlying moderately friable calcareous tuffs which were penetrated by the vine roots. They demonstrated the importance of knowing the level of exchangeable lime not only in the soil but also in the parent material when this is at a depth of less than 80 cm. In the tests the critical levels of lime for Rupestris du Lot and 99 Richter were 14.4% and 21.7% respectively. *Bench grafting trials with hybrid direct producers.* A number of Seyve-Villard hybrids were whip-grafted on 41 B, Teleki, 99R, Rupestris du Lot and 216-3 Castel. Results in this and the previous year [see *H.A.*, 22: 3190] showed poor take of Seyve-Villard 18315, 18283, 23657, 12303 and 12375 on 31 Richter and 216-3 Castel. *Paraffin waxing on bench-grafting.* Carignan scions were whip-grafted on rooted stocks of Rupestris du Lot, 99R and 41B. The grafted plants were dipped into commercial paraffin wax at 60-70° C. and immediately planted out, planting conditions being particularly bad. Percentage success (in August) with the 3 different stocks were 73, 56 and 31 for waxed plants compared with 22, 24 and 22 for untreated plants.

2720. MIŠURENKO, A. G., AND PRESLER, R. I. Pre-grafting stratification of rootstock cuttings. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 3, pp. 44-6, bibl. 1.

To improve the graft union of vines rootstock cuttings should be stratified for 5-8 days at temperatures of 24-26° C. round the upper ends and 13-15° C. round the basal ends.

2721. TUPIKOV, M. A.

The polarity of vine shoots. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 3, pp. 31-4, bibl. 8, illus.

A discussion on polarity and its utilization in the propagation of vines by "kiljčevanie" [see next abstract] and other methods.

2722. KOSTJUK, JA. E.

"Kiljčevanie" of cuttings with manure heating. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 3, pp. 38-44, bibl. 1, illus.

Methods of stratifying cuttings by placing them vertically with their morphologically upper ends at the bottom of trenches are described. Altogether 7 systems were used, with 2,000 cuttings, tied in bundles, in each. The trenches were filled with various stratification media and were covered with a thin layer of sawdust, a thick layer of horse manure and straw mats in the first 6 experiments, which differed from each other only in the methods and materials used for stratification, but with the seventh system heat was provided by a thin layer of dung and sunlight through glass. This last method was found unsatisfactory, producing only 68.5% calloused or rooted cuttings, while the thick manure covers resulted in from 94.3 to 99.8% success. Best of all was method 2 in which the lower (morphologically upper) part of the cuttings was stratified in subsoil containing 9% sand and the upper part in damp sand; the temperature was kept low at the bottom of the trench thus preventing shoot development, and high at the top around the morphologically basal ends of the cuttings to encourage rooting.

2723. ARHANGELSKAJA, V. V.

The frost resistance of planting material in relation to the origin of the cuttings. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 4, pp. 45-8, bibl. 5.

A discussion supplemented by experimental data showing that vines propagated in northern areas are more frost resistant than the same varieties propagated in the south.

2724. MARKIN, M. I.

The effect of growth stimulators on cuttings and transplants. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 4, pp. 40-4, bibl. 1, illus.

In the trials described, heterauxin, α -NAA, 2,4-D, 2,4-dichlorophenoxybutyric acid and potassium permanganate applied to hardwood cuttings of vines, and the heterauxin, indolebutyric, ortho-chlorophenoxyacetic and para-chlorophenoxyacetic acids applied to softwood cuttings did not improve either rooting or rate of survival, and in some cases reduced success

below that of the controls. A few of the stimulators, notably heteroauxin and potassium permanganate, were, however, effective when applied in conjunction with the two methods now commonly used to induce rooting, i.e. "kiljčevanie" and scratching the bases of cuttings longitudinally with a special instrument.

2725. DRAGAŠ, M., AND AVRAMOV, L.

The application of synthetic phytohormones in grafting of vines. [Serbian, with English summary 1 p.] *Yearb. Fac. Agric. Belgrade*, 1952, pp. 157-67, bibl. 12, illus.

Experiments on the treatment of vine grafts with IAA, NAA and "Roche 202" are described. Applications of IAA (heteroauxin) were found to be the most satisfactory, producing healthy callus formation resulting in good graft union and successful rooting. Unfavourable effects caused by the treatments are also discussed and a further study of growth stimulators and their rates and methods of application is recommended.

2726. HERBST, W., AND PHILIPP, K.

Radiofosphor (P^{32}) als methodisches Hilfsmittel zum Studium des P-Anspruchs und P-Verteilung bei Pfropfreben. (Radioactive P^{32} as an aid to the study of P requirements and P distribution in grafted vines.)

Weinb. wissenschaft. Beih., 1952, 6 (3): 65-73, from abstr. in *Biol. Abstr. Sect. D*, 1953, 27, No. 7680.

The distribution of P in young grape-vine grafts can be studied very accurately with radioactively labelled H_3PO_4 . Even in early developmental stages young grafts require P, which is supplied by the substratum. Further study should show whether early P manuring of the substratum is desirable for better union and growth where P content is very low. The callus tissue at the union of stock-scion is the first region to require P. To some extent it functions as a physiologic P-absorption filter. This function, however, is largely lost when the stock-scion union has become perfect. Another region increasingly in need of P develops in the scion shoot. Apparently the P level of the callus is an index of the mutual compatibility of stock and scion and the P content of the growing scion an index of its functional capacity. [Translation of authors' summary.]

2727. ANNE, P., AND DUPUIS, M.

Contribution à l'étude de la nutrition minérale de la vigne en Alsace. (A contribution to the study of the mineral nutrition of the vine in Alsace.)

Ann. agron. Sér. A, 1952, 3: 524-5.

In continuation of experiments begun in 1950 at Riquewihr, N, P and K absorption in vines was studied by means of foliar diagnosis, the leaf material being selected so as to demonstrate the effect of soil, variety and rootstock. Soil. Marked differences in composition were found in some cases, but these were not always related to the nature and richness of the soil. In other cases composition was fairly similar on soils of different quality. Determination of the exchangeable elements in the top soil did not make it possible to estimate P and K absorption by the vine. *Varieties and rootstocks.*

Differences in nutritional level were small. Comparison of 1950 and 1951. N, P and K contents were almost always higher in 1950 than in 1951 when rainfall was heavier.

2728. PORTJANKO, V. F.

Foliage application of nutrients to vines.

[Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 4, pp. 36-9, illus.

Superphosphate (13-7% P_2O_5) in 2 to 10% dilution applied 5 times between 10 July and 10 September increased the yield and sugar content of grapes and had a particularly favourable effect on the next year's fruit buds developing at the time of the treatment. KCl in 0.3-0.4% concentration gave similar results. A superphosphate bordeaux combination was also found satisfactory.

2729. DEPARDON, —, MAUVISSEAU, —, AND BURON, —.

Effets résultant de pulvérisations de solutions d'urée sur le feuillage de la vigne. (Effects of urea foliage sprays on vine.)

C.R. Acad. Agric. Fr., 1953, 39: 193-5.

In a preliminary small-scale experiment, 3 post-blossom applications of urea, at 6 g. per litre and 0.8 litre per plant, were given to vine plants at 12 day intervals. By the end of August the leaves of the treated vines were more vigorous, a darker green and had a higher N content than the controls. Ripening was delayed.—Stat. agron. oenol. de Blois, I.N.R.A.

2730. VEGA, J., AND FOX, J. M.

Correlación entre superficie foliar y producción en vid. (Relationship between leaf area and yield in the vine.) [English summary 11 lines.]

Rev. Fac. Cien. agrar. Mendoza, 1950 2 (2): 17-34, bibl. 17 [received 1953].

Fifteen 15-year-old Malbec vines selected 20 m. apart in a vineyard at the Estación Experimental Central at Luján de Cuyo, Argentina, were used in an investigation of the relationship between leaf area and yield. Statistical analysis of the results showed the existence of (1) a highly significant direct relationship between the average area of the 6th leaf from the base [on primary fruiting shoots (not sideshoots) and fruit yield; (2) a significant direct relationship between the average areas of the 6th, 7th and 8th leaves taken together and yield; (3) a significant inverse relationship between average area of the 6th leaf and sugar content of the must.

2731. DERKUNSKAJA, M. D.

The productivity of vine branches in relation to their age. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 3, p. 37.

Production figures are presented for the varieties Silvaner and Riesling showing that shoots on young (2-3-year-old) branches bear heavier crops than those on older ones. This confirms the recommended pruning method for multiple branch-vines, in which old branches are removed.

2732. WEAVER, R. J.

Berry size of seedless grapes.

Calif. Agric., 1953, 7 (1): 7, 15, illus.

The spray application of the diethanolamine salt of 4-chlorophenoxyacetic acid at 5, 10 or 15 p.p.m. acid equivalent to the clusters of Thompson Seedless and Black Corinth vines, pruned to 4 to 6 canes, at or preferably 1 week after full bloom resulted in increased size of berries, a reduction in degree Balling and increased total acidity. Spraying also increased pedicel thickness and decreased berry shatter. Girdling combined with growth regulator produced a further increase in berry size. Increasing the concentration of growth substance to 25 p.p.m. or more did not increase size further and it injured the vines or clusters. Small-scale trials with other seedless varieties, in which clusters were dipped in solutions of growth regulator, also showed increases in berry size, but there was no evidence that seeded varieties would benefit from the treatment. [See also *H.A.*, 23: 341.]

2733. WEAVER, R. J.

Thinning and girdling of Red Malaga grapes in relation to size of berry, color, and percentage of total soluble solids of fruit.
Proc. Amer. Soc. hort. Sci., 1952, 60: 132-40, bibl. 12, illus.

Thinning flower clusters to 8, 12, 16 or 20 per vine generally increased berry weights, but had no consistent effects on colour or total soluble solids. Thinning berries to about half the total number increased colour and total soluble solids, but had little effect on berry weights. In 1950 girdling in late July resulted in more colour than girdling in mid-August, but in 1951 these effects were reversed; in both years, however, most colour developed when girdling coincided with a total soluble solid percentage of 13 or 14, regardless of the amount of colour that had already developed at that stage. Girdling increased the percentage of total sugar plus starch in the basal portions of shoots of berry-thinned vines at harvest time by about 24%.

2734. MITCHELL, F. G., AND BURLINGAME, B. B.
Thinning Tokay grapes.

Calif. Agric., 1953, 7(5): 10, illus.

An economic survey of berry thinning operations, conducted in 1952 in 103 Californian vineyards, showed that net returns for Tokay grapes rose from \$147.29 per acre (unthinned) to \$245.99 for the more severely thinned group in which \$18.00-25.00 had been expended on thinning.

2735. MALAN, A. H.
The slanting trellis.

Fmg S. Afr., 1953, 28: 61-4, illus.

The slanting trellis used for table grapes consists of posts 4 ft. 6 in. high with slanting cross-pieces 4 ft. to 7 ft. long carrying wires about 1 ft. apart. In an example illustrated in detail a 5 ft. cross-piece is used with 3 ft. projecting on the higher side and 2 ft. on the lower. On the higher side, exposed to the sun, the end of the cross-piece rises to 5 ft. 11 in., while at the lower end it is only 3 ft. 6 in. above the ground. The system of trellising is fully described and its many advantages enumerated. Its disadvantages are the high cost, tabulated in detail and totalling £202 per morgen [£96 per acre], and the fact that cross row cultivation cannot be practised as in overhead trellising.

2736. BADALJAN, V. T.

Obtaining crops from vines in the second year from planting. [Russian.]
Vinodelie i Vinogradarstvo, 1953, No. 1, pp. 34-6, illus.

An intensive training and cultivation method evolved in Armenia, consisting of multiple-branch pruning, topping, fertilization, irrigation and spraying of vines, resulted in a light yield within 2 years of planting. One-year-old grafts planted in December, 1949, came into bearing in 1951; the variety Aligote producing 32 cwt. of grapes per ha. and Pino černyi 28 cwt. per ha. In 1952 the yields were 70.6 and 91.6 cwt. per ha. respectively.

2737. P[EYER], E.

Lenkbare Rebbergpflug. (A dirigible cultivator for the vineyard.)
Schweiz. Z. Obst- u. Weinb., 1953, 62: 133, illus.

The horse-drawn Goldenberg cultivator (illustrated) has proved useful both in the vineyard and in the field.

2738. LAMAZOU-BETBEDER, —.

Recherches sur la maturation. (Studies on ripening.)
Ann. agron. Sér. A, 1952, 3: 537.

The evolution of the principal organic acids in different vine varieties during ripening was studied at Toulouse with a view to determining their effect on the character of the wine. At maturity the content of tartaric acid was higher than that of malic acid in the varieties Chalosse, Malbec and Mauzac, while in Negrette the contents were similar.

2739. DUPAIGNE, P.

L'organisation du contrôle de la maturité commerciale des fruits en France. (Regulating the "commercial maturity" of fruits in France.)

Fruits d'Outre Mer, 1953, 8: 98-103.

Official indexes of maturity for table grapes and for naturally and artificially coloured oranges were instituted by the Ministry of Agriculture in 1951. The index for table grapes is a sugars/acids ratio of at least 25 for normal maturity and of 22 for minimum maturity, but some consider these figures too high. For oranges the criteria are a total soluble extract/citric acid ratio of at least 6.5 and a Brix figure of at least 9.5. The question of control is under discussion with the Spanish authorities.

2740. WHITE, L., AND COLQUHOUN, T. T.

Economics of dehydrating vine fruits.
Quart. Rev. agric. Econ., 1953, 6: 25-7.

In view of the large capital outlay required for equipment that would be used for only a short period each year, bulk drying in central dehydrators would add almost 20% to the cost of producing and marketing sultanas. Bulk dehydration, however, may be advantageous in the production of semi-luxury goods such as muscatels. A method of fitting curtains to sun-drying racks is suggested which would allow the racks to be used for sun-drying in ordinary seasons and for dehydration in poor weather. Cost figures are given.

2741. ANON.

Humification des sarments de vignes: action fertilisante. (The composting of vine shoots: their manurial value.)

Rapp. Cons. Exp. Rech. agron. Algér. 1951/52, 1952, pp. 14-16.

The manurial value of vine shoot compost was compared with that of farmyard manure in an experiment with 5 replications conducted by the Laboratoire d'Agrologie de l'Institut Agricole d'Algérie and the Laboratoire d'Horticulture. 45-metre rows of potatoes received either no manure or 100 kg. of either vine shoot compost or farmyard manure. The mean yield for vine shoot compost was 552 kg. per row compared with 491 each for the control and farmyard manure treatments.

2742. TAŠKOVSKI, M.

A contribution to the knowledge of the nutritive value and digestibility of vine leaves. [Serbian, with French and Russian summaries 2½ pp. each.]

Annu. Fac. Agron. Sylvic. Skopje, 1949/50, 1951, 3: 207-28, bibl. 10 [received 1953].

Shortage of fodder in Macedonia led to experiments on the ensilage of vine leaves. A satisfactory product acceptable by sheep was finally obtained.

Nuts.

(See also 2533, 2544, 2549, 2571, 2587, 2623, 2756m, 3692j.)

2743. STRONG, W. J.

Nut culture in Ontario.

Bull. Vineland hort. Exp. Stat. 494, 1952, pp. 25, illus.

This bulletin is addressed to amateurs and gives notes on climate and soil, cultivation, pollination and propagation. The most suitable areas climatically are a strip along Lake Ontario and a broader belt north of Lake Erie. The main groups of nuts of interest in Ontario are the walnuts, hickories, chestnuts and filberts. Suitable varieties are recommended.

2744. BARRETT, H. C., AND ARISUMI, T.

Effect of vermiculite in inducing fibrous roots on tap-rooting tree seedlings.

Rep. 43rd annu. Mtg north. Nut Grs' Ass. 1952, Rockport, Ind., pp. 131-2, illus.

The chief difficulty encountered in transplanting several nut tree and other commonly tap-rooted seedlings is thought to be the lack of a branched root system. The methods and results of a fairly simple technique of inducing fibrous roots, that of growing seedlings in vermiculite, are presented. [From authors' summary.]—Dep. of Horticulture, Univ. of Illinois.

2745. SERR, E. F., AND FORDE, H. I.

Sprays for control of preharvest drop of Peerless almonds.

Proc. Amer. Soc. hort. Sci., 1952, 60: 193-6, bibl. 1.

In 1950, sprays of 2,4-D at 10 p.p.m. and of 2,4,5-Tp at 20 p.p.m. applied to whole trees when hulls first began to dehisce were effective in delaying dropping of Peerless almonds in California for at least 7 weeks after application. In earlier tests 2,4-D had given similar control both when individual branches and when whole trees were sprayed, but 2,4,5-Tp had not reduced drop

to a significant extent. Neither the trees nor nut quality appeared to be affected by the treatments.

2746. GRAVES, A. H., AND NIENSTAEDT, H.

Chestnut breeding. Report for 1951-1952.

Rep. 43rd annu. Mtg north. Nut Grs' Ass. 1952, Rockport, Ind., pp. 120-30, bibl. 5, illus.

The paper combines a progress report on chestnut breeding at Connecticut Agricultural Experiment Station with some practical instructions on grafting and inarching. Blight resistance is believed to be related to soluble tannin content. Work is in progress on the translocation of antibiotic substances in grafted trees.

2747. HONDA, N., AND FUKAI, H.

Root development of chestnut trees in relation to edaphic conditions. (1.) [Japanese.]

J. hort. Ass. Japan, 1952, 20: 166-74, bibl. 28, illus.

Surveys of root penetration in relation to soil type are in progress with chestnut trees (*Castanea crenata* S. et Z.). Data obtained in 3 cases are given in this report. Root penetration was observed by the trench method, and draining capacity of soil layer was estimated by percolation rate expressed in time necessary for 500 c.c. water to percolate through a soil disc of 8 cm. in diameter and 4 cm. in height. A chestnut tree which was growing vigorously on the talus land derived from sandstone of Palaeozoic formation showed that 16.6% of its roots penetrated to a soil depth of 80-260 cm. Percolation rate of this soil at depths of 30, 60 and 140 cm. was 25 minutes 30 seconds, 59 minutes 40 seconds, and 15 minutes 30 seconds respectively, values which indicate moderate draining capacity. Soils in which chestnut trees are wont to die off when about 15 years old, and where roots cannot be found below 60 cm. from the surface, showed a percolation rate of 2 minutes 8 seconds at a depth of 140 cm. This readily leaching substrate is a probable cause of shallow rooting. In a soil of clayey residue derived from Hornblende-biotite-granite, which showed a percolation rate of 4 hours 41 minutes 20 seconds at a depth of 30 cm., a chestnut tree developed only 4.1% of its roots at a depth of 80-120 cm.

Y.A.

2748. MCKAY, J. W., AND CRANE, H. L.

Preliminary results from training Chinese chestnut trees to different heights of head.

Rep. 42nd annu. Mtg north. Nut Grs' Ass. 1951, Urbana, Ill., pp. 22-9, bibl. 2 [received 1953].

Observations made at Beltsville, Md., indicate that early pruning of young Chinese chestnut trees causes severe dwarfing and consequent delay in the formation of catkins and the bearing of nuts. It is suggested that all pruning operations should be delayed until the trees reach bearing age, and from then on low limbs may be removed gradually year by year until the trees are trained to the required height.

2749. REBOUR, —.

Le pacanier en Algérie. (The pecan in Algeria.)

C.R. Acad. Agric. Fr., 1953, 39: 102-3, bibl. 2.

Notes are given on the cultivation of the pecan, *Carya*

olivaeformis, in Algeria. It is grown on a small scale in the Mitidja area and common varieties are Elizabeth, Success, Moore, and P.22 (a Boufarik variety). It is not soil-exacting but requires a damp site. Planting distance should be not less than 20 x 20 m. Average annual yields per tree at Boufarik are 30 kg.

2750. EIGSTI, O. J., AND BEST, R. B.

Colchicine for nut improvement programs.
Rep. 43rd annu. Mtg north. Nut Grs' Ass.

1952, Rockport, Ind., pp. 99-101, bibl. 4.

A technique of treating vegetative buds with colchicine to induce polyploidy has been developed in experimental work on pecan seedlings at Eldred, Illinois. The method is described.

2751. HUNTER, J. H., AND HAMMAR, H. E.

Influence of cultivation, mulching and fertilizers on chemical composition of pecan leaves and their relation to yield and quality of nuts.

Proc. Soil Sci. Soc. Amer., 1952, 16: 346-9, bibl. 7.

In 1946 and thereafter a pecan orchard near Albany, Georgia, was subjected to a split-plot experiment in which the main treatments were a blue lupin cover crop sown in the autumn and (1) turned under in the spring followed by clean cultivation in the summer, and (2) mown and left as a mulch during the summer followed by cultivation and reseeding in the autumn. Superimposed fertilizer treatments were O, P, K and PK, the amounts applied per tree being equivalent to 10 lb. each of available P_2O_5 and K_2O . Leaf samples were analysed in September of each year. None of the treatments significantly affected leaf N, K or Ca. By the fourth year of treatment leaf P had been significantly increased by application of P. Leaf Mg was significantly increased by mulching but not by fertilizer treatments. There was no close correlation between yield of nuts or quality of kernels and the level of any one element in the leaves, but there was evidence that quality was influenced by the balance of elements in the leaves.

2752. WHITEHOUSE, W. E., AND JOLEY, L. E.

Propagation of the pistachio nut.

Amer. Nurserym., 1953, 97 (2): 10-11, 90, illus.

Results obtained at Chico, California, with buds of the pistachio varieties Red Aleppo and Trabonella inserted on seedlings of 4 *Pistacia vera* varieties show that the length of bud shield had no apparent effect on bud take, nor was there any appreciable difference between normal and inverted T bud placements. The vigour of the shoots from which the buds were taken, however, strongly influenced the success of budding. The best times for budding were summer and autumn, and early transplanting to the permanent site accompanied by liberal watering is considered of primary importance. Notes are given on the possibility of top-working seedlings of *P. vera* and its hybrids with *P. atlantica*, *P. chinensis*, *P. integerrima* and *P. terebinthus*. The placement of the bud was found to have no influence on bud take.

2753. DEKKER, P.

Wal- of okkernoten. (Walnuts.)

Cult. Hand., 1953, 19: 92-5, illus.

The chief difficulties in walnut growing in Belgium are pollination and susceptibility to low temperatures.

Notes are given on choice of soil, fruitfulness and pollination, pruning, and vegetative propagation, particularly with reference to grafting good varieties on frost resistant rootstocks. The grafting should be carried out under double glass in a greenhouse under moist conditions at a temperature of 22° C. When successfully grafted in the spring the plants may be transferred into the open in June or July. New varieties briefly described are Kleinmaren (which has good fruit characters and is a good pollinator for the next two varieties), Margriet, Blonde Tross, and Solitair (a self-fertile variety).

2754. OZOL, A. M., AND ZARUBIN, A. F.

The influence of environment on the modification of hybrid nut seedlings. [Russian.]

Doklady Akad. Nauk S.S.R., 1952, 87: 287-90, bibl. 5, illus.

Observations were made on interspecific crosses between *Juglans regia*, *J. cinerea*, *J. nigra*, and *J. sieboldiana*, grown in South Kirgiz and around Moscow, 2 areas differing widely in both climate and soil. The results show that in the formation of the characters of hybrids environment is the deciding factor, and this can modify their development in whatever direction is desired.

2755. BRERLEY, W. G.

Hormones help black walnut root grafts.

Minn. Horticulturist, 1953, 81: 44, being
Pap. misc. J. Ser. Minn. agric. Exp. Stat. 797.

In previous attempts to propagate black walnut varieties by root grafting without hormone treatment not more than 15% success has been obtained. In 1951 and 1952 several new varieties were root grafted onto seedling roots, all the grafts being treated with Hormodin No. 2. The powder was dusted on the tips of the scions and over the union. The grafts were then set in sawdust with only the tip buds exposed and were kept at a temperature of 65° F. There were no untreated controls. Of 64 grafts made in 1951, 90% were living at the end of the season, and of 100 grafts made in 1952, 71% were living. A controlled experiment on the value of hormone treatment will be made in 1953.

Noted.

2756.

a ANON.

Tennessee strawberry

Amer. Nurserym., 1951, 94 (4): 38 [received 1953].

"Tennessean", a late flowering, early ripening, productive variety.

b ANON.

New hardy strawberry.

Amer. Nurserym., 1951, 94 (4): 38 [received 1953].

Red-Rich, for freezing.

c CROWLEY, D. J., AND OTHERS.

Cranberry production in Washington.

Ext. Circ. Wash. St. agric. Ext. Serv. 144, revised 1953, pp. 4.

d DARROW, G. M.

Albrinton strawberry and Angola and Ivanhoe blueberries.

Fruit. Var. hort., 1952, 7: 19-20, illus.

e DRAIN, B. D.
Some inheritance data with black raspberries.
Proc. Amer. Soc. hort. Sci., 1952, 60: 231-4, bibl. 2.

f HESLOP-HARRISON, Y.
Cytological studies in the genus *Rubus* L.
I. Chromosome numbers in the British
Rubus flora.
New Phytol., 1953, 52: 22-39, bibl. 39, illus.

g HOPE, G. W.
Frozen fruits and vegetables—variety trials.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Ctte 1951, pp. 2.
Strawberries and raspberries.

h JOHNSTON, R. E.
Commercial soft fruit growing in East
Scotland.
Scot. Agric., 1953, 32: 216-19.
Raspberries and strawberries.

i KOBLIC, J.
Vinné matoliny jako nouzové krmivo.
(Grape residue as fodder.) [English, with
German and Russian summaries.]
Sborn. čsl. Akad. Zeměd., 1952, 25: 457-62,
bibl. 5.
Chemical analyses of residues obtained at
grape pressing.

j KRONENBERG, H. G.
Veredeling van kleinfruit in de Verenigde
Staten van Amerika (2) and (3). (Small
fruit breeding in the U.S.A. (2) and (3).
[English summaries 5 and 12 lines respectively.]
Meded. Dir. Tuinb., 1953, 16: 105-13, bibl.
18, illus., and 16: 253-65, bibl. 18, illus.
No. 2 concerns raspberries and blackberries,
No. 3 blueberries and cranberries. [For (1)
see *H.A.*, 23: 1580.]

k NIEDERBACHER, A.
La funzione della vite nella difesa del
suolo. (The role of the vine in soil conserva-
tion.)
Riv. Vitic. Enol., 1953, 6: 52-7.

l OBERLE, G. D., AND MOORE, R. C.
Transmission of the autumn-fruiting charac-
ter of crosses of red and black raspberries.
Proc. Amer. Soc. hort. Sci., 1952, 60:
235-7, bibl. 6.

m O'ROURKE, F. L.
Factors affecting nut tree propagation.
Rep. 42nd annu. Mtg north. Nut Grs' Ass.
1951, Urbana, Ill., pp. 78-82, bibl. 30
[received 1953].
A review of methods.

n SEDLÁČEK, J.
Zkušenosti s prováděním hromadné a
individuální selekce révy vinné v Mutěnicích.
(Experiments on mass and individual
selections of vines at Mutenice.) [Russian
summary 13 lines.]
Sborn. čsl. Akad. Zeměd., 1952, 25: 449-56.
Work described with 23 varieties, some of
them under observation since 1939.

o WILSON, J. L.
Strawberries paid, raspberries were un-
profitable.
Grower, 1953, 39: 736.
Expenses and returns of small-scale cultiva-
tion in Scotland.

p WILSON, J. L.
Black currants and strawberries.
Grower, 1953, 39: 879.
Expenses and returns of small-scale cultiva-
tion in Scotland.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(See also 2518, 2947a, m, o, p, 3628, 3629, 3665, 3679.)

2757. CHAMBERLAIN, G. C., AND PUTMAN, W. L.
Diseases and insect pests of the raspberry
in Canada.
Publ. Dep. Agric., Ottawa, 880, 1952, pp. 32,
illus.

Virus, fungus, bacterial and physiological diseases and
insects attacking raspberries are described, and recom-
mendations for their control are given.

Disturbances of nutrition or of unknown origin.

(See also 2418-2421, 2484-2486, 2496, 2597-2600, 2606,
2837, 2947d.)

2758. DURAND, L.
Un cas de déprérissement sur pommier dans
le département de la Moselle. (A case of
decline in apple trees in the Department of
the Moselle.)
Pomol. franç., 1953, 80: 5-20, illus.

A decline of apple trees in the Moselle Department of
France was first observed in 1947. The varieties chiefly
affected are Rambour d'Hiver, Saint-Louis, Belle de
Boskoop and Sabot d'Esden. Early symptoms are
leaflessness of the median part of one-year-old shoots
and much reduced yield due to early fruit drop. Later
symptoms are death of young branches, poor flowering
and very low yield of small misshapen fruits. Premature
death appears probable. Control experiments conducted
in 1950-51 consisted of the application of complete
fertilizer at various rates, and dormant, pre-blossom
and summer insecticidal and fungicidal treatment.
Further study is required, but tentative conclusions are
that the cause is a combination of drought (leading to
under-nourishment), pest and disease attacks, and
NPK deficiency.

2759. BRADFIELD, A. E., AND FLOOD, A. E.
Chlorosis in apple leaves.
A.R. East Malling Res. Stat. for 1952,
1953, A36, pp. 109-11, bibl. 5.

Analyses of the leaves of Malling VII rootstock plants
have shown that the carotene content is a linear

function of the chlorophyll content in both healthy and chlorotic leaves whether the chlorosis is due to Fe deficiency, K deficiency or virus infection.

2760. TAVERNIER, J., AND JACQUIN, P.

Assimilation et fixation du bore par le pommier et le poirier fumés au borax. Microdosage colorimétrique de bore dans différents organes de ces arbres fruitiers et dans les sols. (The assimilation and fixation of boron by apple and pear trees fertilized with borax. Colorimetric determination of boron in different organs of such trees and in the soil.)

Ann. agron. Sér. A, 1952, 3: 755-93, bibl. 53, illus.

A study was made of a fruit disorder in certain dessert apple varieties, chiefly the russet reinettes notably Belle de Boskoop, seen also on Conference and Saint Jean pears, in which the fruit splits badly and the skin becomes rough and corky. It has been observed in various parts of France and Switzerland and somewhat resembles drought spot and superficial cork. The B content of the fruit, leaves and flowers of affected trees and of the soil in healthy and affected orchards was determined by a method which is described. B was applied as a solution either to the soil or as a foliar spray, the latter proving the better method. No satisfactory explanation was found for the condition, which was not due to B deficiency and could not be attributed to the weather.

2761. KUPORICKAJA, K. I.

Vascular necrosis of vine transplants. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 2, pp. 48-51, bibl. 1.

Vascular necrosis, one of the most widespread diseases of vines, appears to be the result of intensive respiration of vegetative cells, in the process of which not only carbohydrates but also albumens participate. Experiments showed that necrosis develops more readily in vines growing in soils containing a high percentage of clay than in sandy soils, indicating the effect of aeration on this disorder. Boron was found to control vascular necrosis, and boric acid is now recommended for application to vines at the rate of 1.8 g. in 10 l. water per row metre at transplanting and 0.6 g. per 10 l. during the middle of July.

2762. ANNE, P., AND DUPUIS, M.

Toxicité du cuivre à l'égard de quelques plantes cultivées. (Copper toxicity in some cultivated plants.)

C.R. Acad. Agric. Fr., 1953, 39: 58-60, bibl. 3.

Pot experiments at Colmar Chemical Research Station showed that in acid soils the vine is sensitive to Cu in the concentrations at which, as a result of fungicidal residues, it is found in the cultivated horizons of vineyards. The symptoms of toxicity are smaller darker leaves, shortened branches, limited root development and, at higher concentrations, dwarfing. The addition of Ca carbonate to bring the soil reaction to neutrality greatly reduced toxicity.

2763. LOTT, W. L.

Magnesium deficiency in muscadine grape vines.

Proc. Amer. Soc. hort. Sci., 1952, 60: 123-31, bibl. 9, being *Pap. J. Ser. N.C. agric. Exp. Stat.* 397.

Thirty-year-old Scuppernong vines showing "late-summer chlorosis" received the following treatments: (1) nil, (2) $MgSO_4$ solution injected into the stems in 2 successive years, (3) $MgSO_4$ applied to the soil in auger holes in 3 successive years, (4) $MgSO_4$ broadcast in 3 successive years, (5) $MgSO_4$ broadcast in the first year and Mg acetate broadcast in the third year. In the first year only injection increased leaf Mg and reduced chlorosis. In the second year both injection and broadcast $MgSO_4$ increased leaf Mg; there was less chlorosis in all plots and hence the effects of treatments were not clear. In the third year all Mg treatments, and especially the broadcast treatments, increased leaf Mg. None of the treatments increased yields. Analyses of soil samples representing 2-inch layers down to 12 in. showed broadcast $MgSO_4$ to be carried into the root zone within 2 months. During a year about 80% $MgSO_4$ and only 49% Mg ($C_2H_3O_2$)₂ was lost from the surface 12 in. It would appear, therefore, that the delayed response to soil applications of $MgSO_4$ were not due to the failure of Mg to reach the root zone or to remain there long enough to be utilized by the plants.

2764. SCOTT, L. E., AND SCOTT, D. H.

Further observations on the response of grape vines to soil and spray applications of magnesium sulfate.

Proc. Amer. Soc. hort. Sci., 1952, 60: 117-22, bibl. 2, being *Sci. Pap. Md agric. Exp. Stat. (Dep. Hort.) A371.*

Further observations on the effect of soil and foliar spray applications of magnesium sulfate upon [5 U.S.D.A.] grape vine [selections] are reported. Either application was generally effective in correcting or preventing the development of the foliar chlorosis symptomatic of magnesium deficiency and in increasing the magnesium concentration in the leaves. Failures to obtain response with one selection to soil applications and with another to foliar sprays were associated with no increase in leaf magnesium effected by the treatment. Foliar chlorosis, apparent only in the latter part of the season, was usually associated with magnesium values of the leaf below 0.18%. [Authors' summary. For report of earlier work see *H.A.*, 22: 271.]

2765. CIFERRI, R.

Magnesio-carenza di viti Nebiolo nell'Albese. (Mg deficiency in the Nebiolo vine variety in the Alba district.)

Not. Mal. Piante, 1952, No. 21, pp. 36-8.

A description is given of an interveinal chlorosis due to Mg deficiency observed on Nebiolo vines in an Alba vineyard. The basal leaves were almost always the most severely affected. Mg sulphate was sprayed on at 0.5% at the beginning of May and by mid-June the young leaves were normal or almost normal. The Mg content of the ash of leaf samples was: adult leaves of untreated chlorotic plants 0.17%, and of healthy plants 0.27%; young leaves of untreated chlorotic plants 0.23%, of healthy plants 0.34%; young leaves

of chlorotic plants after treatment 0.29%.—Lab. Micol. Pavia.

2766. CRANE, H. L., AND MCKAY, J. W.

Preliminary report on growth, flowering, and magnesium deficiency of Reed and Potomac filbert varieties.

Rep. 42nd annu. Mtg north. Nut Grs' Ass. 1951, Urbana, Ill., pp. 50-5, bibl. 6 [received 1953].

The results of the experiments described show that there is a great difference in vigour, growth, flowering habit, susceptibility to leaf scorch, winter injury, and infection with a fungus disease believed to be caused by *Labrella coryli* between trees of the Reed and Potomac filbert varieties. In all cases Potomac has been less susceptible. It would appear that much of the leaf scorch in filberts experienced in the past has been due to Mg deficiency or lack of balance between Mg and Ca plus P. Data are presented showing that liberal applications of P alone, or in combination with N, resulted in a highly significant increase in leaf scorch incidence due to Mg deficiency. This in turn resulted in susceptibility to winter injury. Applications of 1,500 lb. per acre of high-Mg dolomite, together with 5 lb. of Epsom salts per tree, did not produce a consistent improvement in leaf scorch, indicating that recovery from Mg deficiency in filberts is slow. [From authors' summary.]—U.S. Dep. Agric. Beltsville, Md.

2767. WOODBRIDGE, C. G., AND McLARTY, H. R.

Further observations and investigations on manganese deficiency in fruit trees in British Columbia.

Canad. J. agric. Sci., 1953, 33: 153-8, bibl. 1, being *Contr. Div. Chem., Sci. Serv. Ottawa 225* and *Contr. Div. Bot. Plant. Path., Sci. Serv., Dep. Agric., Ottawa, 1189*.

Mn deficiency has now been observed in the southern interior of British Columbia on apple, pear, peach, prune, cherry, raspberry, grape, filbert, Chinese and European chestnut, heartnut, walnut, and spinach. [See *H.A.*, 22: 2295.] In most instances the deficiency is slight and symptoms are an interveinal and marginal leaf chlorosis. Marked deficiency symptoms, however, are found in some districts and consist of poor leaf development and necrosis of some tissues. Control experiments on peach, apple and pear are recorded. Spraying with Tecmangam (67% Mn sulphate) was effective at $\frac{1}{2}$ lb. per 100 gal. water on moderately affected trees and at 2 lb. on severely affected trees. A second spray hastening recovery in the second case. Tecmangam, DDT and parathion may safely be used together.

2768. HEALY, W. B.

Treatment of a lime-induced manganese deficiency in peach trees.

N.Z. J. Sci. Tech., Sect. A, 1953, 34: 386-96, bibl. 9.

Peach trees in the Hawke's Bay district showing symptoms of manganese deficiency were submitted to various treatments, including the application of manganese sulphate by spraying, placement round the roots, or solid injections, and the acidification of the soil by applications of sulphur. The effect of the treatments was studied by leaf and soil analyses. The

results indicated that: (1) Manganese sulphate sprays were completely effective in preventing deficiency symptoms. (2) Spraying was effective for the season of application only. (3) Manganese sulphate, sulphur, or manganese sulphate + sulphur, added to the top 6 in. of soil was, in general, unsuccessful in correcting manganese deficiency in peach trees. (4) Putting manganese sulphate round the roots was only partly successful and was effective for one season only. (5) Sulphur was effective in reducing soil pH, but on this soil an increase to the original high level appears to be in progress. (6) Solid injection of manganese sulphate increased the manganese content of the leaves and prevented deficiency symptoms. [From author's summary.]—Soil Bureau, D.S.I.R., Wellington.

2769. TROCMÉ, S., AND CHABANNES, J.

Observations sur la carence en zinc des pommeiers et des poiriers dans la région d'Orléans. (Observations on zinc deficiency in apple and pear trees in the Orleans district.)

TROCMÉ, S.

Observations sur la carence en magnésium du pommier. (Observations on magnesium deficiency in the apple tree.)

Ann. agron. Sér. A, 1952, 3: 639, 639-40.

(1) A serious decline with symptoms of Zn deficiency was previously reported in apple and pear trees in orchards near Orleans. Winter spraying with 5% unneutralized Zn sulphate in 1950-51 resulted in a considerable improvement in growth in the following year, the improvement being correlated with increased Zn content of the leaves (14 γ Zn per g. dry matter in untreated unhealthy trees, 24 in treated trees and 38 in healthy trees).

(2) Mg deficiency in apple trees was observed in orchards in Île-de-France and Orleans. It was generally sporadic, mild and without influence on yield. A serious case, however, was met with at Brie in Reinette de Caux apples on deep clay regularly supplied with P and K but not N; leaves from unhealthy trees showing incipient chlorosis contained 1.78 parts CaO per 100 parts dry matter, 0.75% K₂O and 0.33% MgO, whereas leaves from healthy trees contained 1.99% CaO, 0.98% K₂O and 0.75% MgO. The symptoms were much less evident in 1951 than in 1949 and 1950 for unknown reasons. Spraying with solutions of 2-4% Mg sulphate each spring caused no burn and led to a great improvement, if not complete cure, after a number of years.

2770. TRECCANI, C. P.

Osservazioni su alcuni disturbi fisiologici delle mele durante la conservazione. (Notes on some physiological disturbances in stored apples.) [English summary 11 lines.]

Riv. Fruttic., 1953, 15: 145-63, bibl. 19, illus.

Notes are given on studies (some of them by the author) on bitter pit, lenticel spotting, Jonathan spot, and scald in apples in cold storage. In tests at the Stazione Sperimentale di Ortofrutticoltura at Milan with Stayman Winesap and Stark Delicious stored at 1-3° C., bitter pit appeared after about 80 days' storage and developed for the next 50 days, after which it increased little even when the fruit was removed from store. By contrast lenticel spotting has 2 periods of

development: the first within 40 days of picking, and the second from the end of February to the beginning of March, at which season the disorder spreads through the whole fruit in a few days on removal from store and leads to rot through fungal attack. Premature picking predisposed these 2 varieties to bitter pit; late picking lessened scald.

2771. GERHARDT, F., AND SAINSBURY, G. F.
Soft scald and its control in Delicious apples.
Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 97-100, bibl. 4.

Causes of soft scald, previously not a major storage problem of Delicious apples in the Pacific Northwest, were studied. The apples were submitted to 11 different handling and storage treatments and it was shown that while certain combinations of fruit susceptibility and storage temperatures produced up to 24% loss due to soft scald, storage at 34° F. for the first 8 weeks and then at 31° F. resulted in scald-free fruit.

2772. GRASSO, V.
Alterazioni di natura incerta in foglie di *Prunus* spp. (A leaf anomaly of unknown origin in *Prunus* spp.) [English summary 5 lines.]
Ann. Sper. agrar., 1953, 7: 147-55, bibl. 27, illus.

The anomaly observed on *Prunus* sp. (var. Niche-Niche) near Florence in 1947 is believed to be due to bud mutation, and is of no economic importance. The abnormal leaves are much elongated, are irregularly incised, carry numerous crest-shaped marginal appendages, have chlorotic yellow patches, and their veins are often confluent. In the following year the buds on the branch from which the malformed leaves arose were very much smaller than normal, and produced similar leaves. A similar condition was observed in *P. cerasus* var. *pissardii*.—Osserv. Fitopat. Firenze.

2773. FOGLIANI, G.
Segnalazione di una alterazione della vite del tipo "panachure". (Variegated foliage disorder in vine.)
Not. Mal. Piante, 1952, No. 21, pp. 8-10, bibl. 9, illus.

A description is given of a vein chlorosis observed in the province of Trento in 1952 on an 8-year-old Merlot vine grafted on Rupestris du Lot. The same type of disorder had previously been observed in Italy at Frascati and in Sicily. Early symptoms are vein chlorosis, principally on the midrib, of apical leaves. At a later stage median leaves of shoots are affected and chlorosis covers a wide area over the main veins, either symmetrically or confined mainly to one half of the leaf. Other symptoms are shortened internodes and a forking of shoots.—Ist. Pat., Milan.

2774. BALDACCI, E.
Problemi fitopatologici della viticoltura Valtellinese. (Phytopathological problems in vine growing in Valtellina.)
Atti Accad. Ital. Vite, 1951 (issued 1952), 3: 146-52, bibl. 8.

A description is given of a leaf-reddening of vines in Valtellina, first observed in 1948 and believed to be due to physiological and/or parasitic causes, and of a

decline resembling court-noué but of unknown cause first observed in 1951.

Climatic factors.

(See also 2493, 2494, 2676, 2723, 3365, 3386.)

2775. LAWRENCE, E. N.
Estimation of weekly frost risk using weekly minimum temperatures.
Met. Mag., 1952, 81: 137-41, bibl. 3, illus.
SMITH, L. P.
Estimating the frost risk of an orchard site.
N.A.A.S. Quart. Rev., 1953, No. 19, pp. 291-5, bibl. 1.

In the first paper a method is described of estimating the probable frost risk in spring in a given field, after only a short period of temperature observations, by "weighting" such observations with standard contemporary and long-term records made at a nearby meteorological station.

In the second paper the results are given of a frost liability survey of proposed orchard sites made by this method at Luddington Experimental Horticulture Station.

2776. ROULLEAU, J.
Les gelées printanières. Comment en limiter les dégâts. (Spring frosts and how to reduce their damage.)
Atomes, April 1951, pp. 130-4, illus.
[received 1953].

An account of the mechanism of radiation frost and of factors affecting its severity is followed by a survey of the value of available frost protection methods.

2777. SWIFT, H. L.
Factors in frost control.
Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 183-91.

Types of frost occurring in Washington and possible methods of preventing them are discussed. In the opinion of the author the addition of heat from some fuel burning source is the surest and best way of protecting an orchard from frost damage. The use of water either for sprinkling or flooding is considered unsuitable under the conditions of the Pacific Northwest, and wind machines are satisfactory only when used in conjunction with orchard heaters.

2778. BROOKS, F. A.
The action of wind machines and heaters used for frost protection on calm clear nights.
Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 193-8, bibl. 9, illus.

A brief discussion is given of the various methods of reducing the severity of radiation frosts which occur on calm, clear nights. Under typical conditions 1° to 3° F. can often be gained by removing obstructions to drainage of the shallow layer of cold air. Burning many small fires is still the most effective but expensive frost protection practice, and various blowers and horizontal propellers are also satisfactory but are still too costly. The most promising method at present is the combination of a wind machine and 15 or more heaters per acre.

2779. BANNISTER, E. A.

Some factors to consider in planning frost protection in deciduous orchards.

Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 199-201.

Factors affecting the need for frost protection and suitable methods for different conditions are discussed. Three types of frost protection system, viz. individually attended oil burners, burners fed from an underground pipe system, and a combination of wind machine and burners, are briefly described.

2780. CARLONE, R.

La difesa antigelo in frutticoltura. Considerazioni tecniche ed economiche. (Prevention of damage by frost. Technical and economic considerations.)

Reprinted from *Il Coltivatore*, February-March 1952, Nos. 2-3, pp. 11, bibl. 4.

Smoke, heating, artificial rain, infra-red rays and air fan methods of late frost protection are briefly considered. It is concluded that there is as yet no method which is satisfactory in all respects. None of the new systems combines low cost with technical efficiency, and growers in Italy consequently still rely on the older methods, especially smoke.

2781. SOLOVIEVA, M. A.

The effect of cultural operations on the degree of winter injury to fruit trees. [Russian.]

Sad i Ogorod, 1952, No. 2, pp. 28-32.

Data are tabulated to show that cultural operations modify the degree of winter injury to fruit trees, particularly in the southern parts of the U.S.S.R. Favourable results were obtained with irrigation, inter-cropping (e.g. with potatoes), and the application of fertilizers. Frost resistance was shown by trees receiving a complete mineral fertilizer in early spring followed by PK applications in the first half of the growing period.

2782. ALEKSANDROV, F. A.

The rôle of adventitious buds in the renewal of activity in apple trees damaged by winter frost. [Russian.]

Bot. Zurnal, 1952, 37: 691-4, bibl. 1, illus.

Often in the Gorky province all dormant apple buds are killed by frost without the wood being fatally damaged. Adventitious buds develop from the live tissues, but the process may take up to 4 years, depending on the extent of the injury. Two methods used to encourage the formation of these buds are described. The first system consists of grafting shoots with healthy dormant buds onto the damaged tree, which results not only in the growth of the scion but also in the formation and development of adventitious buds on the stock. The second method is the introduction of heteroauxin into the damaged wood at the rate of 10 mg. per l. water.

2783. KOMPANECEVA, I. S.

Attempts to delay bud-burst. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 4, pp. 34-5.

To control spring frost damage on vines trials were conducted in Moldavia on methods of prolonging dormancy. Whitewashing delayed bud-burst with the variety Aligote by 2 days, and non-removal of laterals

by 6 days. Corresponding delays for the variety Traminer were 1 and 4 days.

2784. MODLIBOWSKA, I.

Some experiments on "washing off" the hoar frost.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 73-7, bibl. 8, illus.

"Washing off" hoar frost with water in the early morning has been claimed by some to be a method of preventing frost damage to plants. It should not be confused with frost protection by continuous water sprinkling. From laboratory and field trials involving the measurement of temperatures in potato and strawberry plants with fine wire thermocouples, it is concluded that, in general, this treatment cannot be regarded as a reliable means of protection against frost damage. Conditions are specified under which "washing off" may be beneficial and others under which it may be ineffective or even harmful.

2785. JENNY, J.

Essais de mesure de la température des bourgeons de pommiers et de poiriers en hiver. (Experiments on the measurement of the temperature of buds of apple and pear trees in winter.)

Rev. romande Agric. Vitic., 1953, 9: 26-7.

Studies were conducted on bush apple and pear trees at Vennes-sur-Lausanne (650 m. above sea level) in January-April, 1952, to determine how the temperature of the buds varied in relation to that of the surrounding air during day and night, and to find a suitable instrument for measuring temperatures during the application of frost control measures. It was found that the temperature of the buds was slightly above that of the surrounding air in sunlight (maximum difference 4.7° C.) and slightly below at night (maximum difference 2.5° C.). After dusk, the nearer the soil the more the air cools as the result of radiation; buds near the ground can thus be affected by night frosts even when the temperature higher up the tree does not fall below zero. Among the instruments tested, a mercury thermometer with a white bulb recorded the temperatures of the buds most accurately.

2786. SEBASTIANI, R.

Freddo e trattamenti invernali al pesco. (Cold weather and the dormant treatment of peach trees.) [English summary 2 lines.]

Riv. Ortoflorofruttic. Ital., 1953, 37: 25-9, bibl. 10, illus.

Observations in February, 1952, at the Florence Agricultural Institute showed that dormant spraying with bordeaux mixture in cold weather made peach trees liable to frost injury if it took place late in the afternoon and the mixture consequently did not have time to dry before nightfall. In Morettini's varieties in a low-lying site the injury chiefly took the form of a dieback of the current year's branches to half their length.

2787. OKAMOTO, S.

Sun-scald of peach trees. I. Sun-scald in relation to tree temperature. [Japanese.]

J. hort. Ass. Japan, 1952, 20: 243-9, bibl. 16.

The temperature of branches of variously trained peach

trees affected by sun-scald was measured by a potentiometer with thermocouples inserted through the bark into the cambial layers. It was found that horizontal branches and branches running north-east, north or east all showed high temperatures and were susceptible to sun-scald. Trees, moreover, whose branches tended to show high temperatures and which were especially susceptible to sun-scald, were those trained in a vase shape, those with big scaffold limbs, old trees, trees of declining vigour and trees growing in dry soils. Whitewashing has little effect. Sun-scald was particularly prevalent during the season of the highest branch temperatures. Y.A.

2788. LAHTIONOV, A. F., AND TEMNOVA, S. V.
Solutions for whitewashing fruit trees. [Russian.]

Sad i Ogorod, 1953, No. 2, pp. 30-3, bibl. 1.

Alternation between intense insolation during the day and very low temperatures during the night is the main cause of early death of apple and pear trees in the coastal regions of the Soviet Far East. The recommended control measure of whitewashing the stems and branches of trees is old, but the composition of the 2 washes suggested is new. One of them is a mixture of lime and an aqueous extract of soya beans, while the other in addition contains curd. The solutions are stated to be much more adhesive and weather resistant than the usual lime washes and if applied in the autumn are still fully effective in the spring. The preparation of both mixtures is described and quantities of the components and of the made-up sprays necessary for thorough coverage of young and mature trees are given.

2789. DELL'OLIO, G.

Risultati ed insegnamenti della campagna antigrandine in Piemonte 1951. (Results of the Piedmont anti-hail campaign in 1951.)

Atti Accad. Ital. Vite, 1951 (issued 1952), 3: 316-29.

In 1951 anti-hail rocket experiments were conducted at 19 centres in Piedmont, an important vine and fruit growing district in which hailstorms occur from June to September and periodically cause severe damage. The centres varied in size from isolated small farms to a single large area of 17,500 ha., with 136 rocket-firing posts. As in the previous year very satisfactory results were obtained. In one case damage was 40% in neighbouring unprotected areas and negligible in the protected area, and in another 60-80% compared with 15%. In addition to turning hail into rain, rocket fire reduced the force of high winds and broke up the clouds. The advantages of regional as opposed to sporadic local protection was evident.

2790. RAO, U. N., RANGACHARLU, V. S., AND KUPPUSWAMY, B. S.

Effect of linseed oil spray on the growth and yield of apple trees on the Nilgiris.

Indian J. Hort., 1952, 9 (4): 59-63, bibl. 6.

The low irregular apple yields at Coonoor Pomological Research Station are attributed chiefly to the mildness of the Nilgiri winters. In small-scale experiments conducted in 1948-51 to determine the effect of linseed oil sprays on growth and yield, 3% raw linseed oil emulsion was sprayed on the buds of three varieties in late

January and early February. The treatment caused the trees to flower 10-14 days earlier in most cases and resulted in increased production of shoots, flower clusters per shoot and fruits per shoot.

2791. ANON.

Fruchtbomen en de overstroming. (Fruit trees and the floods.)*

Fruitteelt, 1953, 43: 183.

In this very brief note it is stated that pears on wild stock are the least susceptible of the fruits to salt water flooding, apples and black currants more so, stone fruits and red currants much more so, and gooseberries very susceptible. Salt water flooding for longer than 1 month results in the death of most trees. The damage may not appear for 2 or 3 years after flooding. The advice is given to apply gypsum and refrain from working the soil.

Viruses.

(See also 2714, 2947.)

2792. BAWDEN, F. C., AND PIRIE, N. W.
Physiology of virus diseases.

Annu. Rev. Plant Physiol., 1952, 3: 171-88, bibl. 108.

A review article, dealing with changes in host metabolism that influence virus infections and the effect of infection on host metabolism.

2793. POSNETTE, A. F.

Virus diseases and the propagation of fruit trees.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 179-81, illus.

The dangers inherent in the present situation, with numerous virus diseases present in orchards and fruit-tree nurseries, are discussed. Careful selection of rootstocks and scion material is needed to reduce the incidence of these diseases in new orchards, and the necessary precautions are described. [Author's summary.]

2794. DE BRUYN OUBOTER, M. P., BEIJER, J. J., AND VAN SLOOTEREN, E.

Diagnosis of plant diseases by electron-microscopy.

Antonie van Leeuwenhoek, 1951, 17: 189-
Hoogeschr. Wageningen, 1952, 52 (Referaten): 30a-31a.

The value of electron-microscopy for diagnosing plant diseases, particularly virus diseases, is discussed. Electron photographs are given of many diseases including tulip virus I, *Phaseolus* II virus, carnation mosaic virus, a cucumber virus, and tobacco mosaic and necrosis viruses.

2795. MULDER, D.

De proliferatieziekte van appel, een virusziekte. (Proliferation disease of apple, a virus disease.) [English summary 6 lines.]
Tijdschr. PIZiekt., 1953, 59: 72-6, bibl. 9, illus.

Grafting experiments have shown that the disease of apple trees causing proliferation of water shoots and

* See also 2493-2495.

abnormal enlargement of stipules [see *H.A.*, 22: 2305] is due to a virus. It has been given the name proliferation disease. Although it was first observed on the variety Goudrenette, it has now been reported on other varieties in Holland. The disease is probably identical with the witches' broom of apple trees in Italy.

2796. FOGLIANI, G.

Segnalazione della virosi a scopazzi del melo. (Witches' broom in apple.)
Not. Mal. Pianta, 1952, No. 21, pp. 10-11, bibl. 1, illus.

Notes are given on an outbreak of witches' broom observed in an apple orchard at Varese in 1952. The phenomenon was first noticed on one or two 8-year-old Abbondanza trees on seedling stocks. In 1950 some Golden Delicious had been crown-grafted on Annurca. In 1952 two showed witches' broom and 3 others, from which the scions had been taken, were also affected. The possibility of transmission by grafting [see *H.A.*, 21: 1451] and pruning tools is stressed.—Ist. Pat. Milan.

2797. POSNETTE, A. F.

Virus transmissions between *Prunus* and *Malus* species.
A.R. East Malling Res. Stat. for 1952, 1953, A36, p. 131, bibl. 4, illus.

A ring spot virus was transmitted by grafting from plum to apple seedlings, causing foliage symptoms distinct from those of apple mosaic. A virus, possibly that causing rubbery wood, was transmitted by grafting from apple to peach seedlings, causing foliage symptoms in the form of purple rings and lines. [Author's summary.]

2798. POSNETTE, A. F.

Virus diseases of plums.
A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 182-3, illus.

To aid nurseriesmen to avoid infected material, short descriptions, with illustrations, are given of 6 virus diseases causing leaf symptoms on plums, 2 causing bark symptoms and 3 non-transmissible disorders with virus-like symptoms.

2799. KRYTHE, J. M.

Onderzoekingen over mozaiek of bontbladigheid van perzik- en pruimebomen. (Investigations on a virus disease of peaches and plums.)
Tijdschr. PlZiekt., 1953, 59: 51-61, bibl. 23, illus.

A virus disease of peaches and plums occurring in the Netherlands is described. The symptoms, which vary according to the variety, consist of yellow lines, rings, oak-leaf patterns and vein-clearing. It has not yet been possible to identify the disease with one of the 46 virus diseases described for stone fruits. The virus nature of the disease has been proved by budding. Experiments on mechanical transmission (sap inoculation) were unsuccessful. Observations do not indicate the occurrence of insect transmission. The disease is found only on budded trees; trees on their own roots are free from symptoms. Experiments so far indicate that the virus is neither soil-borne nor seed-transmitted. Heat treatment and chemical treatment with $ZnSO_4$ or $CaCl_2$ proved to

be ineffective for control of the disease. Up to the present elimination has been achieved only by selection of healthy stocks and of healthy graft or budwood.

2800. WILLISON, R. S., AND BERKELEY, G. H.

An experiment in cross protection with some stone fruit viruses.

From abstr. in *Proc. Canad. phytopath. Soc.*, 1952, 19: 20.

In studies at the Dominion Laboratory in Plant Pathology, St. Catherines, Ontario, pairs of year-old Montmorency cherry trees inoculated in March, 1949, with either cherry yellows or [cherry] necrotic ring spot, were re-inoculated in March, 1950, with another virus or strain. Like the first, the second virus in each case, with one possible exception, also induced shock symptoms, which were, however, sometimes less severe than when healthy plants were infected. Under the experimental conditions cross protection by one virus against another appears to have been incomplete or lacking; the distribution of shock symptoms over the trees indicated that in sour cherry these viruses spread rapidly throughout newly infected trees. The shock symptoms produced by either of two strains of necrotic ring spot in trees already infected with tatter leaf differed from those occurring when the order of infection was reversed or when either strain was used on healthy trees.

2801. NYLAND, G., AND BROOKS, R. M.

Virus-free cherry.
Calif. Agric., 1953, 7 (3): 8.

In a nursery comparison between virus-free and commercial budwood of Bing and Black Tartar cherries the former gave 5% and 1% misses compared with 33% and 37% for the 2 varieties, and 95% and 99% saleable trees compared with 52% and 45%. A programme designed to produce virus-free budwood and rootstocks is outlined.

2802. WOLFE, H. R., AND ANTHON, E. W.

Spray programs in stone fruit orchards decrease populations of insect vectors of the western x-disease virus.

Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 156-7, bibl. 3.

In the Wenatchee valley area the cherry fruit fly sprays, parathion at 1 lb. 25% w.p., TEPP at $\frac{1}{2}$ pt. 20% emulsion, and methoxychlor at 3 lb. 50% w.p. per 100 gal., gave effective control of the leaf hoppers *Colladonus geminatus* and *Scaphytopius acutus*, vectors of western x-disease virus. Lead arsenate sprays, which previously were widely used and are still sometimes applied in the cherry fruit fly programme, were found ineffective against the vectors.

2803. STELLWAAG, F.

Wichtiges über die Reisigkrankheit der Rebe. (On the broom disease of vine.) [English summary 5 lines.]

Mitt. Klosterneuburg, 1953, 3: 91-4.

The "Reisig" disease of vine, which gradually saps the plant's vitality and eventually produces broom-like growth of shoots, foliage and tendrils, has been observed in Germany for some time. The rather variable symptoms cannot be regarded entirely as arising from a

nutritional disturbance nor do they agree with those of any virus disease hitherto described. Certain observations, however, point to the virus nature of the trouble, although experimental transmission has not been achieved. Well cared for vineyards in favourable localities appear to be exempt.

2804. RAYCHAUDHURI, S. P.

Studies on bayberry yellows.

Phytopathology, 1953, 43: 15-20, bibl. 18, illus.

A yellows type of virus disease was observed in bayberry (*Myrica carolinensis*), blueberry and cranberry plants growing in New Jersey. The virus was transmitted by cleft-grafting and by using dodder (*Cuscuta campestris* and *C. subinclusa*), but not by juice inoculation. It was transmitted to a number of vegetables (carrot, onion and celery) and ornamental plants. In all susceptible species except dodder the virus caused typical yellows symptoms. It is different from any of the known yellows viruses.—Rockefeller Institute, N.Y.

2805. CORNUET, P.

Les maladies des fraises et la sélection sanitaire. (Diseases of strawberries and selection of healthy stock.)

[Publ.] *Inst. nat. Rech. agron. B.T.I.67*, 1952, pp. 7, bibl. 4, illus.

For the benefit of raisers of selected strawberry plants in France, an account is given of the precautionary measures that must be taken in order to produce healthy plants. The virus diseases are described together with brief notes on the symptoms and control of other diseases and pests. The scheme for producing healthy plants under official control is outlined, information being given on suitable areas, varieties and spraying programme, and on the technique of grafting for virus testing.

2806. CORNUET, P.

Sur l'extraction et l'inoculation par voie mécanique de certains virus affectant les fraises. (On the extraction and inoculation by mechanical means of certain viruses affecting strawberries.)

C.R. Acad. Sci., Paris, 1952, 235: 271-3, from abstr. in *Rev. appl. Mycol.*, 1953, 32: 135.

Proceeding on the hypothesis that the difficulty of extracting the infective principle from virus-diseased strawberry leaves is due, as in the case of dahlia mosaic virus, to the liberation of tannins in the sap, the author eliminated these substances by the extraction of samples of strawberry and *Fragaria vesca* leaves in France with ethyl alcohol after lyophilization to prevent dehydration of the virus. The crude solution remaining after centrifugation was inoculated by rubbing with carborundum into healthy *F. vesca* plants, two to four of which out of every five developed symptoms resembling those of Prentice's virus 1 [mild crinkle virus] in the course of three weeks. There was no difference in respect of virulence or symptomatology between the extracts from strawberry and those from *F. vesca*. The spectrophotometric analysis of precipitates of the virus revealed the presence of nucleic acids which were absent from healthy plant extracts.

2807. POSNETTE, A. F.

The green petal disease of strawberry.

A.R. East Malling Res. Stat. for 1952, 1953, A36, p. 184, illus.

Green petal—a new virus disease of strawberries.

Plant Path., 1953, 2: 17-18, bibl. 3, illus.

The symptoms of this disease, first observed in Kent in 1951 and now known to be caused by a graft-transmissible virus, are described.

2808. POSNETTE, A. F., CROPLEY, R., AND ELLEN-BERGER, C. E.

Progress in the heat treatment for strawberry virus diseases.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 128-30, bibl. 4.

Strawberry viruses of the crinkle types have been inactivated by maintaining plants at 37° C. for 7 to 11 days. Apparently virus-free plants have been propagated after such treatment, and the importance of this is discussed in relation to the Ministry of Agriculture Special Stock Scheme. [Authors' summary.]

2809. POSNETTE, A. F.

Heat inactivation of strawberry viruses.

Nature, 1953, 171: 312, bibl. 3.

The best method of controlling strawberry viruses is the provision of healthy planting material but, except for the virus-free clone of Royal Sovereign and the recently bred Auchincruive Climax, no plants of other common varieties have been found without at least a mild crinkle virus. Experiments on heat therapy of strawberry plants infected with crinkle viruses began at East Malling Research Station in 1950. Apparently complete virus inactivation has been achieved in plants of Early Cambridge, Huxley's Giant and Perle de Prague. Heat therapy experiments are continuing. The results obtained so far are summarized.

2810. VIDAL, J.-P.

Fasciations et doubles-noeuds sur les sarments des cépées indigènes du Rif. Sont-ils des symptômes de dégénérescence infectieuse? (Are fasciations and double-nodes on the shoots of the indigenous vines of Rif symptoms of infectious degeneration?)

Progr. agric. vitic., 1953, 139: 154-9, illus.

Investigations were undertaken to determine whether the fasciations and double-nodes encountered in North African vine varieties are normal characters specific to the varieties or symptoms of infectious degeneration. Characters displayed by the Rif varieties are fasciation, double-nodes, abnormality of leaf and tendril, leaf mosaic and fruit abortion. They were transmitted by grafting. It was concluded that they are symptoms of infectious degeneration.

2811. MCKAY, J. W., AND CRANE, H. L.

Bunch disease of black walnut.

Rep. 42nd annu. Mtg north. Nut Grs' Ass. 1951, Urbana, Ill., pp. 56-62, bibl. 4

[received 1953].

The characteristic symptoms of the bunch or brooming disease of walnuts are the production of brooms or sucker growth, due to a graft-transmissible virus, on the trunk and main branches, tufting of terminals, profusion of small branches from axillary buds, dwarfing of leaves,

and dying back of the trees resulting sometimes in death. Of the walnut species now grown in the eastern United States the eastern black walnut seems to be the most resistant, and the only one for which the cutting out of infected limbs may possibly be a satisfactory control measure.

Bacteria.

2812. CROSSE, J. E.

Bacterial diseases of stone-fruit trees in Britain. XI. Bacteriosis of apricot.
Trans. Brit. mycol. Soc., 1953, 36: 38-45, bibl. 17, illus.

A hitherto unrecorded bacterial disease of apricots, caused by *Pseudomonas mors-prunorum* Wormald, involving the leaves, shoots and older wood, is described in detail. Differences in the relative amounts of acid produced on lactose and maltose are suggested as an additional criterion for distinguishing *P. mors-prunorum* from the related stone-fruit pathogen, *P. prunicola* Wormald. The existence of biologically specialized forms of *P. mors-prunorum* was demonstrated in cross-inoculation experiments with cherry, plum and apricot strains of this organism. The relation of the bacterial die-back to other forms of apricot die-back is discussed. The apricot bacteriosis is compared with that of cherry and plum, and the importance of environmental factors in the epidemiology of the shoot wilt considered briefly. [Author's abstract.]—East Malling Res. Stat.

2813. CARPENTER, T. R., AND SHAY, J. R.

The differentiation of fireblight resistant seedlings within progenies of interspecific crosses of pear.

Phytopathology, 1953, 43: 156-62, bibl. 14, illus.

A new method of inoculating pear seedlings with *Erwinia amylovora* is described together with the results of studies of the optimum age and temperature for inoculating resistant pear seedlings to obtain the maximum infection. The effect of hardness of host tissue on disease development is discussed.—Purdue Univ. agric. Exp. Stat., Lafayette, Indiana.

2814. SPRAGUE, R.

Blossom sprays and dusts to curb fire blight, 1952 results.

Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 25-6.

Zineb (Parzate) applied at the rate of 1 lb. and $1\frac{1}{2}$ lb. per 100 gal. was again very useful in reducing fire blight infection of pears in Washington.

Fungi.

(See also 2746, 2947q, z, 2948d-h.)

2815. BURKHOLDER, C. L., AND SHARVELLE, E. G.

Work progresses with brown-rot.

64th A.R. Ind. agric. Exp. Stat., 1951, pp. 39-40, illus. [received 1953].

Extensive brown-rot blossom-blight [*Sclerotinia fructicola*] studies were carried out in the greenhouse in 1949 and 1950. Artificially infected blossom [of unspecified fruit] was sprayed with a number of fungicides of which the phenyl-mercury and glyoxalidine compounds were unsatisfactory. Phygon and liquid lime-sulphur were found to have both protectant and eradicant properties,

while wettable sulphur acted primarily as a protectant. In field trials neither CR 305 nor liquid lime-sulphur gave satisfactory control of brown rot on French Damson. [See also H.A., 22: 3597.]

2816. MOORE, M. H., AND TALBOYS, P. W.

Note on infection of blackberry fruits by the brown rot fungus, *Monilia fructigena*.
A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 136-7, bibl. 3, illus.

Monilia fructigena is recorded as a pathogen of the cultivated blackberry, Himalaya Giant. An isolate from blackberry caused characteristic brown rot symptoms when inoculated into apple fruits, and blackberry fruits were likewise infected by an isolate from the apple. [Authors' summary.]

2817. HUS, P.

Schurftbestrijding. Voorkomen of genezen? (Scab control. Prevention or cure?)
Fruiteelt, 1953, 43: 112-13, illus.

The traditional preventive method of apple scab control, which aims at keeping the foliage continually protected, involves a great many spray applications. The new method suggested is based on the fact that infection only takes place when specific temperature and humidity requirements for the germination of the spores have been fulfilled. If mercury sprays are applied within 4-5 days of infection taking place the fungus will be killed. The need for spraying can be determined from weather records. As sprays are only applied after infection has actually taken place, the number of applications is reduced to a minimum. The method was tested with success in 1952 and is being tested again this year.

2818. LAGUADE, V.

La lutte contre la tavelure du pommier dans le midi. (Control of apple scab in the south of France.)
Rev. hort. Paris, 1953, 125: 836-8, illus.

Experiments carried out on a commercial scale over the last 4 years in the Cevennes have shown that the most dangerous periods for scab infection are March-April and late August-September. Copper sprays gave best control but caused scorch and premature leaf fall. Micronized and dispersible sulphur sprays are recommended until petal fall and after mid-August. They are likely to cause damage during summer. Dithiocarbamates gave good results during summer but more information is required on their effect on yield and red spider population.

2819. PALMITER, D. H., AND EMMERSON, F. H.

Fungicide mixtures as a possible means of improving apple scab and rust control.
From abstr. in *Phytopathology*, 1953, 43: 109.

Combinations of Fermate with Phygon XL or Cormerc improved apple scab and rust control over that obtained with single fungicide treatments. These mixtures also tended to improve fruit finish.

2820. PALMITER, D. H.

Rust diseases of apples and their control in the Hudson Valley.
Bull. N.Y. St. agric. Exp. Stat. 756, 1952, pp. 26, bibl. 7, illus.

Experiments on the control of the apple rusts, *Gymnosporangium juniperi-virginianae*, *G. globosum* and *G. clavige*ps, were conducted between 1941 and 1952. The materials tested were wettable sulphurs, phenyl mercury compounds, dithiocarbamates, naphthoquinone, glycolidines, organic sulphur and phthalamide. The carbamates, especially ferric dimethylthiocarbamate (ferbam), were highly specific towards rusts. $\frac{1}{2}$ – $1\frac{1}{2}$ lb. ferbam (76% active principle) per 100 gal. water gave effective rust control when applied 3–4 times beginning at pink bud stage and ending with the second or third spray after bloom. 1– $1\frac{1}{2}$ lb. ferbam or $\frac{1}{2}$ lb. ferbam plus 3 lb. wettable sulphur per 100 gal. water controlled rust and scab. The addition of ferbam to any anti-scab organic fungicide usually resulted in improved rust control.

2821. BLUMER, S.

Neuere Erfahrungen über die Bekämpfung des Apfelmehltaus. (New experiments on the control of apple mildew.)
Schweiz. Z. Obst- u. Weinb., 1953, 62: 57–62, illus.

Trials at four localities with proprietary sulphur preparations plus soft soap as wetter and spreader for the control of apple mildew [*Podosphaera leucotricha*] on Jonathan apple trees are described. The best results recorded were obtained with two pre-blossom and two post-blossom applications of Thiovit plus 2% soft soap.

2822. SPRAGUE, R.

Mildew spray trials at the Tree Fruit Station in 1952.
Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 27–30.

As in the previous year [see *H.A.*, 22: 2333] the sulphur compounds appeared most effective against mildews attacking apple, pear, cherry and peach.

2823. WADE, G. C.

Ripe spot and target spot of apples.
Tasm. J. Agric., 1953, 24: 14–19, bibl. 5, illus.

Gloeosporium sp. causes "ripe spot", reddish-bordered brown spots at maturity, on Sturmer, Granny Smith and Cleopatra apples in Tasmania. In storage these develop into "target spots" of rot with concentric markings. Similar rots occur in Democrat and Crofton in storage without the preliminary ripe spot symptoms. In experiments SR 406 at 2 lb. per 80 gal. water or 50% TMTD at $1\frac{1}{2}$ lb. per 100 gal. water applied at the calyx stage gave good control.

2824. TORIKATA, H., AND KOMAI, Y.

Studies on the resistance of Japanese pear to the black spot disease fungus (*Alternaria kikuchiana* Tanaka). III. On the polyphenol oxidase in the fungus-free filtrate of culture media.

Ann. phytopath. Soc. Japan, 1952, 16: 63–8, from abstr. in *Rev. appl. Mycol.*, 1953, 32: 134.

The laccase (polyphenol oxidase) reaction was detected in the fungus-free filtrate of a potato decoction culture of the pear black spot fungus (*Alternaria kikuchiana*), but tyrosinase was not present. Dialysis of the culture filtrate through a collodion membrane showed that the

enzyme solution retained in the dialyser does not cause death of the leaf tissue, but blackening is induced by the dialysate. A positive polyphenol oxidase reaction also developed in culture solutions of some other species of *Alternaria*, most of which, however, were innocuous to pear leaves. Presumably, therefore, the polyphenol oxidase produced by *A. kikuchiana* is not directly responsible for the death of pear leaves and fruits, though it may be concerned in the development of the lesions.

2825. HEYNS, A. J.

Gummosis of stone fruit trees.
Fmg S. Afr., 1953, 28: 34–6, illus.

The several causes of gumming in peaches and apricots are described. Both species may show gumming when growing rapidly under moist conditions, but if water-logging occurs this may develop into sudden wilting followed by death, a condition known as "wet feet" or sour sap disease. Both species also suffer from gum spot disease caused by *Clasterosporium carpophilum*, which can be controlled by a single winter application of bordeaux mixture at 10: 10: 100 or other copper fungicides. The gummosis canker disease of apricots is described in more detail. Preliminary culture studies have shown the presence of an organism related to *Pseudomonas cerasi* v. *prunicola*. There are no satisfactory control measures, but investigations are in progress. These include studies of rootstock effects, because the downward spread of the disease usually stops at or near the graft union. Pending the results of these investigations it is suggested that recommendations for the control of bacterial canker in other countries be applied tentatively.

2826. ANON.

Freckle of stone fruits.

Agric. Gaz. N.S.W., 1953, 64: 83–4, illus.

Freckle (*Cladosporium carpophilum*) is a serious disease of early apricots and of mid- and late-season peaches and nectarines in the coastal districts of New South Wales. In apricots partial control can sometimes be achieved with bordeaux mixture plus white oil at late bud-swell, and experiments show that excellent control is obtainable by following this with tetramethyl thiuram disulphide (thiram). For peaches and nectarines a programme including bordeaux mixture plus white oil at late bud-swell and several later applications of sulphur products is recommended. If the disease is well established, trees should be severely pruned before spraying.

2827. GUBA, E. F.

Peach canker caused by the fungus *Fusicoccum persicae* E. and E.

From abstr. in *Phytopathology*, 1953, 43: 109.

For several years peach canker has caused havoc in 2 south-eastern Massachusetts peach orchards. Only the current season's terminal growth is susceptible to spore infections. Water sprouts or suckers are most seriously attacked, and infections are most numerous at the nodes. The cankers are perennial and the branches die as they become completely girdled. Pycnidia and conidia develop throughout the season but the inoculum is most abundant early. Added damage results from

the invasion of *Fusicoccum* cankers by *Cytospora* and other wound parasites. The etiology and epiphytology of the disease are similar to apple blotch (*Phyllosticta solitaria* E. and E.). There are marked differences in the reaction of peach varieties to infection. . . . A protectant schedule of Ferbam followed by Thiuram or Orthocide in 1952 has given almost complete control of spore infections of the new growth. Protection with the new fungicides was supplemented with eradication of cankers and sanitation.

2828. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.

Forsøg med bekaempelse af ferskenblaersyge ved sprøjtning med svovlkalk. (Experiments on the control of peach leaf curl by lime-sulphur sprays.)

Erhvervsfrugtavl., 1953, 19: 174-5, being *Medd. Stat. Forsøgsvirks. Plantekult.* 497.

In trials on the control of *Taphrina deformans* carried out with 3 peach varieties at Copenhagen and Lolland, lime-sulphur sprays (5% and 10%) were applied twice, viz. a fortnight and immediately before bud burst. The results were observed on 12 June, 1951. The tabulated data show that, on the whole, spraying at bud burst achieved better control of leaf curl in heavily infected trees than did earlier applications. No spray damage occurred with any of the treatments.

2829. ACKERMAN, W. L.

The evaluation of peach leaf curl on foreign and domestic peaches and nectarines grown at the U.S. Plant Introduction Garden, Chico, California.

[*Mim. Publ.*] *U.S. Dep. Agric.*, 1953, pp. 31.

The results are given of a survey undertaken in the U.S. Plant Introduction Garden at Chico in California, during a severe peach leaf curl epidemic in the 1952 season, to evaluate the many nectarine and peach introductions for their susceptibility to leaf curl in comparison with some domestic varieties as standards.

2830. HAMILTON, J. M., AND SZKOLNIK, M.

Factors involved in the performance of cycloheximide (actidione) against *Cocomyces hiemalis*.

From *Abstr. in Phytopathology*, 1953, 43: 109.

Actidione (2 p.p.m.) controlled *Cocomyces hiemalis* when sprayed on cherry foliage after an infection period of 96 hours. In laboratory experiments the chemical was found to give protection equal to or better than fermate and other fungicides. Actidione may affect size and set of fruit if applied within a 10-day period beginning with "shuck split".

2831. GAGNOTTO, A.-V.

La vite come nuovo ospite di *Sclerotium bataticolum* Taub. (The vine as a new host of *Sclerotium bataticolum*.) [English summary 3 lines.]

Boll. Staz. Pat. veg. Roma, 1951 (issued 1953), 9: 17-18, illus.

The fungus *Sclerotium bataticolum*, not previously recorded on the vine, caused the death of some young vines at Catanzaro in 1951.

2832. SAREJANNI, J. A.

Quelques problèmes de l'épidémiologie du mildiou de la vigne en Grèce. (Some problems of vine mildew in Greece.)

Ann. Inst. phytopath. Benaki, 1951, 5: 53-64, bibl. 15 [received 1953].

On the basis of his own observations over the last 20 years the author deals with the distribution and spread of vine mildew (*Plasmopara viticola*) in Greece, the role of winter conidia in carrying infection, the effect of annual rainfall on the incidence of mildew, and the possibility of developing a satisfactory control programme.

2833. AGULHON, R., AND AMPHOUX, M.

Essais de produits de lutte contre le mildiou en 1952. (Experiments on the control of vine downy mildew in 1952.)

Progr. agric. vitic., 1953, 139: 206-13, 233-6.

In experiments made in the Beaucaire plain on the control of vine downy mildew, esso 406, dithane Z 78, sandoz cuprous oxide and bordeaux mixture at various concentrations were tested against 2.0% bordeaux as standard. In the conditions obtaining in 1952 no definite conclusions could be drawn.

2834. BOUBALS, D., AND VERGNES, A.

Essais de fongicides organiques dans la lutte contre le mildiou de la vigne. (Tests with organic fungicides against vine downy mildew.)

Progr. agric. vitic., 1953, 139: 64-9, 90-7, illus.

In tests conducted at the INRA viticultural laboratory in 1952 the effects of 2 proprietary organic insecticides—(S) (N-trichloromethylthiotetrahydronaphthalimide) and (D) (Zn ethylene 2-dithiocarbamate)—on vine downy mildew (*Plasmopara viticola*) were compared with those of (B) bordeaux mixture. The layout was a randomized block; there were 3 replications; each plot contained 64 Aramon vines on 31R rootstocks but only the central 16 vines were observed. Four treatments with each fungicide were given: (S) 0.25, 0.5, 1.0 and 2.0 kg. per 100 l. water; (D) 0.15, 0.3, 0.6 and 0.9 kg. per 100 l. water; (B) 0.5, 1, 2 and 4 kg. Cu sulphate per 100 l. water. Spraying was carried out 7 times between 9 May and 1 July inclusive at rates rising from 500 to 1,300 l./ha. It was concluded that S had a powerful fungicidal effect, was superior to D and bordeaux mixture, and that 0.25 and 0.5 kg. were the most satisfactory doses; and that in the case of D, the 0.3 kg. dose was substantially similar in fungicidal effect to 2% bordeaux.

2835. HUGLIN, P.

Remarques sur les fongicides organiques expérimentés dans les vignobles alsaciens au cours de l'année 1952. (Notes on organic fungicides tested in Alsatian vineyards during 1952.)

Progr. agric. vitic., 1953, 139: 123-5.

The effects of S.R. 406 at 0.5, 1 and 2% and dithane 7-78 at 0.15, 0.3 and 0.6% on downy mildew, on the leaves, and on oïdium were compared with those of bordeaux mixture at 1, 2 and 4% at Colmar Research Station in 1952. The variety employed was Chasselas and the fungicides were applied 4 times, the last time

after hail in July. *Downy mildew* was almost absent, hence fungicidal effect could not be gauged. *Leaves*. Autumn colouring showed about a fortnight earlier on foliage treated with the organics, particularly at the higher concentrations. *Oidium*. At all 3 concentrations bordeaux was more efficacious than the organics. 1 and 2% S.R. 406 were significantly better than 0.5% S.R. 406 and the 3 concentrations of dithane. *Grey mould*. The effects of 1% bordeaux, 0.5% micronized Cu oxychloride, 0.5% dithane 7-78, and 1% S.R. 406 on grey mould were compared on Gewurtztraminer, one of the two most susceptible varieties. Spraying took place at the beginning of September about 6 weeks before the harvest when the disease had not yet made its appearance. The results were: S.R. 406 6.1% infected bunches, Cu oxychloride 11.1%, bordeaux 11.2%, dithane 12.1% and untreated control 17.8%. The number of infected bunches was about 60% less with S.R. 406 and about 30% less with the other fungicides than in the control.

2836. PICCO, D.

Anticrittogamici a basso tenore di rame ed acuprici nella lotta contro la peronospora della vite (*Plasmopara viticola* Berk. e Curt.). (Low-copper and non-copper treatment of vine downy mildew.)

Not. Mal. Piante, 1952, No. 21, pp. 39-46.

Tests were conducted in the Pavia district in 1952 on healthy 25-year-old vines, mostly Barbera on 420-A. The 13 products tested belonged to the following groups: (1) ethylenebisdithiocarbamate acid salts, (2) N-trichloromethylthiotetrahydrophthalimide, (3) a Cu and S mixture, (4) a Cu, P and Ca mixture, (5) Cu and Fe salts of citric acid, (6) 16% Cu oxychloride, (7) Cu and ammonium salts, and (8) Cu sulphate. There were untreated controls, and controls treated with bordeaux mixture. All vines received an anti-oidium sulphur spray in April. Anti-peronospora treatments were given on 22 May, 10 and 28 June and 12 July. Bordeaux mixture gave the best results. It was followed by groups (1), (2) and (6) which were all of the same order of efficacy, and showed 0.76-1.73, 0.64 and 1.04 infected leaves per plant respectively. All the other products were also useful, showing 0.33-5.34 infected leaves per plant compared with 245 in the untreated control.

2837. VIDAL, J.-L.

(1) Sur l'absorption de solutions salines par les feuilles de la vigne à propos de l'emploi de bouillie bordelaise au nitrate de cuivre. (2) Des effets particuliers sur la vigne de pulvérisations contre le mildiou avec bouillies au nitrate de cuivre en substitution de bouillies au sulfate de cuivre. ((1) On the absorption of salt solutions by vine leaves in connexion with the use of copper nitrate bordeaux mixture. (2) The effects on the vine of spraying with copper nitrate bordeaux mixture instead of copper sulphate bordeaux mixture.)

C.R. Acad. Agric. Fr., 1953, 39: 273-7, 277-81.

The absorption of nutrient solutions by vine leaves and the effect of spraying Cu nitrate bordeaux mixture were studied in laboratory and field experiments in 1952.

1. In the laboratory experiment 10 pot plants of 3-year-old St. Émilion on Riparia Gloire de Montpellier were used, 4 growing in compost and 6 in calcareous soil. All received Cu sulphate bordeaux twice a month in May, June and July. In addition some plants in each soil received 15 foliar sprays of K nitrate at rates falling from 7 to 1.5 g./l. water in April-July, and the rest received plain water. All the plants sprayed with nutrient solution displayed more vigorous growth although the first, most concentrated application, caused some burning. Plants on calcareous soil that did not receive nutrient sprays were chlorotic.

2. In the field experiment there were 5 plots each containing 105 4-year-old St. Émilion on Téliké. Treatments were: Cu sulphate bordeaux mixture, Cu nitrate bordeaux mixture, T.P. 13, dithane Z.78, and control. The results were: Cu nitrate bordeaux mixture was at least as efficacious against vine downy mildew as Cu sulphate bordeaux mixture, while T.P. 13 and dithane Z.78 were also efficacious; yield of grapes was greater with Cu nitrate bordeaux mixture (4.787 kg. per plant) than with Cu sulphate bordeaux mixture (4.267 and 3.84 kg.) and than with any of the other treatments, thus indicating a nutritive effect. It is suggested that Cu nitrate bordeaux or supplementary K nitrate sprays should be used to prevent chlorosis on calcareous soils.

2838. LJUBINKOVIĆ, B.

Predviđanje rokova prskanja vinograda protiv plamenjače. (The establishment of a central warning service for the control of vine mildew.) [French summary 1 p.]

Zasht. Bilja, Belgrade, 1953, No. 15, pp. 78-87.

Owing to the weather in 1952 being very unfavourable for the development of downy mildew infection, an experiment designed to establish the value of a central mildew warning service gave inconclusive results and is to be repeated in the following year.

2839. ŠČEBLYKINA, V. M.

A bacterial method of oidium control. [Russian.]

Vinodelie i Vinogradarstvo, 1953, No. 4, p. 54.

A manure solution sprayed on vines gave considerably better control of vine powdery mildew disease than a sulphur dust treatment. [For the preparation and application of the solution see *H.A.*, 22: 2365.]

2840. STALDER, L.

Das Problem der Botrytisbekämpfung im Weinbau. (The problem of *Botrytis* control on vine.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 105-7, 128-32, bibl. 3.

Several reasons are given for the failure of fungicides to control *Botrytis cinerea* in the vineyard: (1) Sugary juice exudes from burst berries, partly covering the copper residue and creating favourable conditions for spore germination. (2) In the susceptible variety Riesling × Sylvaner the berries often become partly detached from the pedicel, thereby offering a point of entry to the fungus. (3) In some varieties the berries are so closely spaced that the spray cannot penetrate into the interior of the bunch. Under such conditions apparently healthy grapes were shown to harbour the fungus in a saprophytic phase and to become infected after picking.

2841. NIENSTAEDT, H.
Tannin as a factor in the resistance of chestnut, *Castanea* spp., to the chestnut blight fungus *Endothia parasitica* (Murr) A. and A. *Phytopathology*, 1953, 43: 32-8, bibl. 25, illus.
Assays of bark extracts with the fungus indicated that the bark of the more resistant species, *Castanea mollissima* and *C. crenata*, contains antibiotic substances in concentrations high enough to cause a retardation of the growth of the fungus, but that the bark of the susceptible *C. dentata* does not.—Conn. agric. Exp. Stat., New Haven.

2842. DARPOUX, H., AND RIDÉ, M.
Recherche de procédés de désinfection des châtaignes contre l'*Endothia parasitica* (Murril) Anderson. (Methods of disinfecting chestnuts to prevent the introduction of *Endothia parasitica*.)
Reprinted from *Phytatrie-Phytopharmacie*, 1952, No. 1, pp. 17-20, bibl. 2.
To prevent the introduction of chestnut blight (*Endothia parasitica*) into France, it is thought advisable to disinfect chestnut fruits imported from countries where the disease is prevalent. The results of several chemical and physical treatments are reported. The following treatments will ensure clean nuts, but all have certain practical disadvantages. (1) Dipping in a solution of commercial formaldehyde for 1 hr at 1%, 30 min. at 2% or 10 min. at 5%. (2) Treatment with ethylene oxide in partial vacuum for 4 hrs using 400 g. per cubic metre. (3) Hot water treatment at 53° C. for 10 min. following dipping in water at 45°-47° C. for 15 min. (4) Autoclaving in partial vacuum.—Stat. centr. Path. veg., Versailles.

2843. GOVI, G., AND DI CARO, S.
Presenza dell' *Ophiostoma fagi* Loos su castagne. (*Ophiostoma fagi* on chestnut.) [English summary 12 lines.] *Ann. Sper. agrar.*, 1953, 7: 211-19, bibl. 4, illus.
Ophiostoma fagi was found in sweet chestnut fruits from the Avellino district in 1949. It was found associated with insect tunnels and had not previously been recorded in Italy.

2844. CAPUANO, E.
Nota preliminare su una *Sphaeropsis* sp. del sorbo (*Sorbus domestica*). (A preliminary note on *Sphaeropsis* sp. found on *Sorbus domestica*.) *Not. Mal. Pianta*, 1952, No. 21, pp. 35-6.
A description is given of a dieback of *Sorbus* observed at Naples. It chiefly affects the young branches and is ascribed to *Sphaeropsis* sp.—Plant Path. Inst., Portici.

2845. PETTINARI, C.
Una macchiettatura delle mele. (An apple spotting.) [English summary 11 lines.] *Boll. Staz. Pat. veg. Roma*, 1951 (issued 1953), 9: 19-29, bibl. 26, illus.
During the winter and spring of 1950 stored Annurca apples often showed spotting caused by a fungus similar to *Pleospora alternariae*.

2846. MOUAT, H. M.
Mouldy-core disease of Delicious apples. *Orchard. N.Z.*, 1953, 26 (2): 7-8.
The mouldy-core disease of Delicious apples is caused by a number of fungi, the chief being *Neofabrea perennans* which can be controlled by weak bordeaux sprays. The following advice is given to reduce wastage from mouldy-core: (1) follow the recommended spray programme, (2) do not use pre-harvest hormone sprays (which retain the most seriously affected apples on the trees), (3) when packing, reject fruit with a deeper yellow ground colour than average, (4) use fruit from the later picks for storage, and (5) do not store fruit after the end of June.

2847. POAPST, P. A.
Fungal rot control tests. *A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee* 1951, pp. 3.
Three materials, ortho-phenylphenol, calcium propionate (mycoban), and the sodium salt of dehydroacetic acid (DHA-S), were tested for the control of fungal rots of apples in store. None was satisfactory.—Cent. exp. Fm., Ottawa.

2848. JONES, A. H., AND FERGUSON, W. E.
The effect of treatment of fresh fruits and vegetables with three fungistats on the mould content of the canned products. *A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee* 1951, pp. 6.
Strawberries, blueberries and tomatoes were dipped in dehydroacetic acid, sodium propionate or peracetic acid and then stored at various temperatures for various lengths of time prior to canning. In general very little protection against mould development was given by any of the fungistats. On strawberries, however, dehydroacetic acid and sodium propionate did exert some inhibitory effect at the lowest storage temperature of 40° F. With blueberries the only material that showed any appreciable inhibitory properties was sodium propionate. With tomatoes temperature of storage had as great an effect as fungistat on mould development.—Div. Bact. Dairy Res. Ottawa.

Mites.

(See also 2947y.)

2849. CHAPMAN, P. J., LIENK, S. E., AND CURTIS, O. F., Jr.
Responses of apple trees to mite infestations: I. *J. econ. Ent.*, 1952, 45: 815-21, bibl. 5, being *J. Pap. N.Y. St. agric. Exp. Stat. 898*.

Half of the trees in 2 young apple orchards in New York were kept virtually free of mites in 1951 by the use of 2 acaricides, p-chlorophenyl p-chlorobenzene-sulphonate and tetraethyl pyrophosphate, while in the remaining trees the mites were allowed to develop unchecked. Heavy populations of European red mite, *Paratetranychus pilosus*, occurred on the untreated trees, but the two-spotted spider mite, *Tetranychus bimaculatus*, was unimportant in both orchards. Among the varieties of apple that produced normal crops during the season, larger yields were harvested from the trees where mites were controlled, but yield differences were statistically

significant only with the Cortland variety. Mite infestations had no apparent effect on fruit size, though they reduced the overall growth of trees. Contrary to earlier reports, better colour occurred on fruit from mite-injured trees, at least in Cortland. Mite feeding reduced the chlorophyll content of the leaves; it did not have any obvious effect on fruit firmness at harvest or after several months' storage, or on the total soluble solids content of the fruit.

2850. COLLYER, E.

The greenhouse red spider mite, *Tetranychus urticae* Koch, on apples in East Anglia.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 159-60, bibl. 3.

This mite was first noticed in abundance on apples and pears in Essex in 1949. Its appearance has followed the use of parathion as an acaricide against red spider mite. Brief notes are given on the host plants and life history of this potential fruit tree pest.

2851. DEAN, F. P., AND NEWCOMER, E. J.

Further studies of orchard acaricides.

J. econ. Ent., 1952, 45: 1038-42, bibl. 5.

The acaricides tested against 5 species of orchard mite on apple trees at Yakima, Washington, included parathion, malathion, EPN, toxaphene, p-chlorophenyl p-chlorobenzenesulphonate and the 2 systemics, schradan and systox.

2852. COLLYER, E.

Biology of some predatory insects and mites associated with the fruit tree red spider mite (*Metatetranychus ulmi* (Koch)) in south-eastern England. II. Some important predators of the mite. III. Further predators of the mite.

J. hort. Sci., 1953, 28: 85-97, bibl. 30, illus. and 98-113, bibl. 40, illus.

In Part II of this paper a list is given of the 45 species of insects and mites which feed on the fruit tree red spider mite, and details are given of the life history and habits of those most abundant in well kept commercial orchards (with the exception of the black-kneed capsid which was dealt with in Part I [see *H.A.*, 22: 1385]). In Part III the remaining, less common species are described.—East Malling Res. Stat.

2853. KIRBY, A. H. M., AND TEW, R. P.

Toxicity of chlorinated phenyl benzenesulphonates to winter eggs of the fruit tree red spider mite, *Metatetranychus ulmi* (Koch). *Nature*, 1953, 171: 479-80, bibl. 5.

Among 9 compounds tested, 4 that had previously shown promise as summer ovicides were found also to possess considerable activity against the winter eggs of the fruit tree red spider mite. These were 4-chlorophenylbenzenesulphonate at 0.115%, phenyl 4-chlorobenzenesulphonate at 0.115%, 4-chlorophenyl 4-chlorobenzenesulphonate at 0.13 and 0.065%, and 2,4-dichlorophenylbenzenesulphonate at 0.13%.

2854. ANTHON, E. W., AND BURTS, E.

Peach silver mite and its control.

Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 37-8.

The peach silver mite [*Vasates cornutus*], which is of microscopic size, is widely distributed throughout Washington and by constant feeding devitalizes the trees, reduces peach size and causes premature dropping. In the past dormant sprays of lime-sulphur have given good control of this mite, but in 1952 dormant and delayed dormant sprays applied in the Orondo area were unsuccessful. A number of experimental sprays applied on 23 July were, however, all effective, and Geigy 338, sulphenone and Aramite gave particularly good seasonal control.

2855. SUMMERS, F. M., AND HOLMBERG, D. M.

Early sprays for brown mites.

Calif. Agric., 1953, 7 (1): 6.

New materials in early sprays for control of brown almond mites.

J. econ. Ent., 1952, 45: 974-81, bibl. 3.

Excellent control of the brown mite, *Bryobia praetiosa*, on almonds and peaches has been obtained by including K-6451 (Ovotran) at 1½ to 2 lb./100 gal., and G-923 (Genite) as a 50% emulsion at 1½ to 2 pts/100 gal. in either the standard pink-bud or petal fall sprays. The triethanolamine dinitro-phenol, DN-289, at 2 qts/100 gal., has shown promise as a dormant spray ovicide.

2856. VAN DEN BRUEL, W. E., AND COLIN, G.

Le problème du tarsonème du fraisier. I. Essais d'orientation sur des traitements curatifs effectués sur champ (1951). (The cyclamen mite of strawberry. I. Preliminary field trials 1951.)

Parasitica, 1953, 9: 14-35, bibl. 3.

Preliminary field trials showed that the cyclamen mite of strawberry (*Tarsonemus pallidus*) can be controlled effectively with parathion, provided the sprays are applied at sufficiently high concentration (0.17% of the commercial product) in sufficient quantity (2,500 litres per hectare = 637 g. active material per hectare) and at short intervals, the chemical having no residual effect. Tests carried out with BHC on a very small scale gave inconclusive results. The problem of strawberry mite control is to be studied further.—Gembloix.

2857. HUFFAKER, C. B., AND KENNEDY, C. E.

Cyclamen mite on strawberry.

Calif. Agric., 1953, 7 (4): 7, 12, illus.

In field tests during 1952 the predatory mite *Typhlodromus reticulatus* or *T. cucumeris* was found to exercise natural control of the cyclamen mite on strawberry, except in 2nd year plantations. Research is in progress to develop methods of mass rearing the predator and distributing it in developing infestations of early-season 2nd year or late-season 1st year fields. Spraying with TEPP to control red spider mite should be confined to early-spring applications to allow of the recovery of the predator population.—Univ. of California, Berkeley.

2858. PATTERSON, N. A., AND LORD, F. T.

Notes on miticides for the European red mite on apple trees in Nova Scotia.

89th A.R. N. Scotia Fruit Grs' Ass., 1952, pp. 134-7.

The effective action, compatibility with other sprays and rates of application are discussed for parathion, ovotran, malathion, dimite or DMC, and aramite.

2859. LIENK, S. E., AND OTHERS.
Resistance of European red mite to parathion.
J. econ. Ent., 1952, **45**: 1082, bibl. 1, being
J. Pap. N.Y. St. agric. Exp. Stat. **905**.

Evidence is presented showing that a red mite, *Paratetranychus pilosus*, population in a New York apple orchard developed resistance to parathion, and apparently also to malathion. The other acaricides tested, namely EPN, systox and Aramite, gave good control.

2860. NEWCOMER, E. J., AND DEAN, F. P.
Orchard mites resistant to parathion in Washington.
J. econ. Ent., 1952, **45**: 1076-8, bibl. 3.

A strain of European red mite, *Metatetranychus ulmi*, resistant to parathion and possibly other organic phosphorus compounds, exists in apple orchards in the Pacific Northwest. A species of parathion-resistant *Tetranychus*, possibly a strain of *T. pacificus* or *T. mcdanieli*, was also found in these orchards. Preliminary tests indicate that these mites may be controlled, at least temporarily, with a number of acaricides including aramite, DMC, EPN, malathion, p-chlorophenyl p-chlorobenzenesulphonate and R-242. [From authors' summary.]

2861. BORDEN, A. D., AND MADSEN, H.
Acaricides on apples and pears.
Calif. Agric., 1953, **7** (4): 6, 13.

On the basis of field tests, carried out in 1952, tentative ratings are presented of 11 acaricides for their toxicity to 3 species of two-spotted spider mite on apple and pear. Observations on phytotoxicity are also noted.—Univ. of California, Berkeley.

2862. DAVIS, D. W.
Some effects of DDT on spider mites.
J. econ. Ent., 1952, **45**: 1011-19, bibl. 6.

From the results of studies on *Tetranychus multisetis* it seems that there are several distinct effects of DDT on both the individual mites and the colonies as a whole. An effect on mites, called irritating effect, causes increased activity and wide distribution. This dispersion results in a higher reproduction potential and hence earlier mite build-up. If the dosages are high enough, there is an actual mortality of some mites, and an increased length of the life cycle. Two of the most important mite predators, *Steiphorus picipes* and *Orius tristis*, were found to be easily killed by DDT. Evidence from population trend studies on banana squashes in the absence of predators confirmed evidence obtained from individual mite studies in that peak populations on squashes with light treatments are reached earlier than on either untreated or heavily treated surfaces.

Insects.

(See also 2551-2554, 2947b, c, h, k, l, s, u, w, x, 2948b, c, k, 3395, 3465, 3515.)

2863. DÜRR, H. J. R.
Organic insecticides for the control of the Argentine ant in trellised vines.
Fmg S. Afr., 1953, **28**: 68-70, bibl. 9.

In 3 experiments various insecticides were applied to vine stems and struts and diagonal wires up to knee-height. The most effective materials were 1% DDT emulsion and wettable powder. These markedly reduced ant infestation for 7 to 8 weeks and ant populations were still low after 12 to 14½ weeks. No adverse effects on mealy bug parasites were observed. The results are discussed in the light of experience gained elsewhere.

2864. KJELLANDER, E.
Undersökningar över blodlusens biologi jämte några bekämpningsförsök. (The biology of woolly aphid and some trials for its control.) [English summary 3½ pp.]
Medd. Växtskyddsanstalt, Stockh. **64**, 1953, pp. 51, bibl. 47, illus.

This last paper in the series dealing with investigations on woolly aphid in western Skåne, Sweden, is largely devoted to the biology of the pest, including its frost resistance. Wind was found to be an important agent in the dispersal of aphids, especially of young larvae, but spread through the sale of infested apple trees by nurseries was also noted. To what extent birds and hairy insects act as vectors could not be ascertained. The damage caused to the tree consists primarily in a stimulation of the cambial layer resulting in swellings which, when burst, are invaded by parasitic fungi, such as *Nectria* and *Monilia*. *Aphelinus mali*, though generally established now, is not yet an important factor in woolly aphid control. Of several chemicals tested in spraying trials a tar oil preparation yielded the best results. HCN fumigation was also attempted. Allington and Cox's Orange were among the varieties most susceptible to the pest, while Transparente de Croncels showed some resistance.

2865. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.
The woolly aphid (*Eriosoma lanigerum*).
Agric. Gaz. N.S.W., 1953, **64**: 36-7, illus.

This aphid is a serious pest of apple throughout New South Wales. Recommended control measures are by (1) the black chalcid wasp (*Aphelinus mali*) which was introduced in 1924-5 but which has been reduced in numbers owing to the use of DDT against codling moth; (2) spraying with BHC at 0·1% gamma isomer at budbreak; or alternatively (3) spraying with E.605 or parathion at 0·0375% active principle, or with lindane at 0·1% gamma isomer, if the trees become appreciably infested in the spring.

2866. GEORGALA, M. B.
The woolly aphid of apple and its control.
Fmg S. Afr., 1953, **28**: 21-2, 27, bibl. 7, illus.

The use of DDT to control codling moth has reduced the effectiveness of *Aphelinus mali* as a parasite of woolly aphid, *Eriosoma lanigerum*, and it has now become necessary to adopt chemical control measures. Recommendations are given for the use of oil-DNOC in winter and of parathion in summer, the latter being the more effective.

2867. MADSEN, H. F., AND BORDEN, A. D.
Aphid damage to pears.
Calif. Agric., 1953, **7** (3): 5, illus.

A petal-fall application of 1 lb. 25% parathion or 2 lb. 25% malathion per 100 gal. will normally control *Aphis gossypii*, *A. rumicis* or *Myzus persicae* attacking pears. Occasionally a second application may be needed.

2868. MALLINJOU, H. M.

Nouvelles recherches sur le puceron vert farineux du pêcher et du prunier (*Hyalopterus pruni* F.) et résultats d'essais de lutte contre ce parasite au moyen d'un systémique. (New investigation on the mealy aphid (*Hyalopterus pruni*) of peach and plum, and results of control experiments with a systemic insecticide.)

Rev. hort. Paris, 1953, 125: 838-9, bibl. 3.

Observations made in France showed that the mealy plum aphid has a definite host preference for winter egg laying, *Prunus* species being preferred in the following order: *P. insititia*, *P. oeconomica*, *P. italicica*, *P. domestica*, *P. persica*, *P. cerasifera*, and *P. spinosa*. Good control throughout the season was obtained on plums and peaches by 2 sprays (petal fall and post-blossom 15-20 May) of 0.1% pestox 3 (44% octa-methyl phosphoramide).

2869. MICHELBACHER, A. E., BACON, O. G., AND DAVIS, C. S.

Walnut aphid study.

Calif. Agric., 1953, 7 (4): 10, illus.

Tests carried out with several chemicals showed systox to be a very promising material for the control of walnut aphid, a single treatment giving protection until the crop was nearly ready for harvest. Applications at the rate of 1.25 and 2.5 lb. active ingredient per acre caused leaf injury, but did not affect nut quality. Data on the effect of several other insecticides are also given. —Univ. of California, Berkeley.

2870. MICHELBACHER, A. E., AND BACON, O. G.

Walnut insect and spider-mite control in Northern California.

J. econ. Ent., 1952, 45: 1020-7, bibl. 5, illus.

DDT has been found much more effective than standard lead arsenate for codling moth control. To avoid a serious increase in walnut aphid, *Chromaphis juglandicola*, population it should be used in combination with an effective aphicide such as parathion or BHC. Mixtures to be applied by conventional and air-carrier sprayers are suggested, and co-ordinated aphid control for whole areas is recommended. The effect of these treatments on spider mite populations is noted. Where mites have increased to a destructive level, good control was obtained with Aramite 15% w.p. at 1 to 2 lb. per 100 gal.

2871. MYBURGH, A. C., AND KRIEGLER, P. J.

Summer spraying with parathion for control of mealy bugs on table grapes.

Fmg S. Afr., 1953, 28: 65-7, bibl. 4.

As a result of field experiments briefly described it is recommended that, in areas where biological control of mealy bugs is ineffective, 2 spray applications of parathion be made a fortnight apart during the summer up to, but not later than, 4 weeks before harvest. Suitable formulations per 100 gal. are 2 lb. 15% wettable powder or $\frac{1}{2}$ lb. 46% or $1\frac{1}{2}$ lb. 20% liquid parathion. Dusting proved less effective than spraying. Further investigations are in progress.

2872. THIEM, H., AND SINGER, G.

San-José-Schildlaus. (San José scale.)

Jber., biol. Bundesanst. Braunschweig, 1951, 1952, pp. 72-3.

E605 forte applied in cold weather is inactive, but with rising temperatures it becomes active. In summer trials on ornamental cherries E605 (0.05-0.1%) was found more effective against San José scale and had longer residual action than Systox (0.1-0.2%) or pestox (0.15-0.3%).

2873. VESPIGNANI, A.

Polisolfuro di calcio ed altri prodotti nei trattamenti invernali al pesco. (Dormant treatment of peach trees with calcium polysulphate and other products.)

Ital. agric., 1953, 90: 69-78, bibl. 6, illus.

Several anti-scale dormant sprays were compared on 3- to 7-year-old J. H. Hale and Superba peaches in the Bologna district in 1952. When frost was experienced after spraying, flower bud and shoot burn resulted from treatment with 4-6 Bé Ca polysulphate. Such damage did not occur, however, with (1) Barium polysulphate used alone at 6-7 kg. per 100 l. water or with 5 kg. miscible tar oil, even when applied twice; (2) 5% miscible tar oil; or (3) 4% miscible light mineral oil.

2874. DELMAS, H. G., AND THERMES, R.

Essai de lutte chimique contre le capnode adulte. (An experiment in the chemical control of adult capnodis.)

Fruits d'Outre Mer, 1953, 8: 53-67, bibl. 5, illus.

Dieldrin, BHC isomer gamma and DDT were tested for the control of adult *Capnodis tenebrionis* in June, 1952. DDT failed to pass preliminary toxicity tests. 25% wettable powder suspension of 0.25% dieldrin and a 0.2% BHC emulsion were sprayed on two 12-year-old Bulida peach trees in cages, and known numbers of capnodis were subsequently introduced. After 3 days the dieldrin-treated insects were all dead, had scarcely touched the leaves and had laid no eggs; the toxic effect of the dieldrin lasted 2 months. After 3 days all the BHC-treated insects were dead but the insecticidal effect of the spray did not last, only 72% of the insects introduced after 12 days dying. It was concluded that 2 dieldrin foliage sprays per season should provide complete control. —Soc. coop. de Recherches et d'Exp. agric. des Pyrénées-Orientales.

2875. FÉRON, M.

État actuel des connaissances concernant la lutte contre le capnode. (Present state of knowledge on capnodis control.)

Congr. pomol. Fr. 1952, being *Suppl. Pomol. franc.*, 1953, pp. 183-92.

Brief reviews are given of knowledge on the biology and control of *Capnodis tenebrionis*. *Indirect control.* Healthy trees in well-managed soil are the least susceptible. *Direct control.* Hand picking on young trees, if the labour supply permits. Foliage spraying after harvesting with arsenicals (especially 0.5-1.0% Pb arsenate), 2% Ba fluosilicate, 1-2% cryolite, 0.5% BHC (containing 13% gamma isomer) or 0.2-0.3% chlordane. Soil treatment against the larvae and young adults with 0.2% technical BHC (containing 10% gamma isomer) or with 0.24% gamma isomer BHC, at 3 l. per young tree; one application just before egg-laying gives protection for the whole summer.

2876. DOSKOČIL, J., AND OTHERS. Hodnocení účinků pokusného leteckého poprašování proti chroustům pomocí Dynocidu. (Control of cockchafer by Dynocide dust applied from an aeroplane.) [Russian and German summaries $\frac{1}{2}$ p. each.] *Sborn. čsl. Akad. Zeměd.*, 1952, 25: 409-14, bibl. 12.

Aeroplane applications of Dynocide (5% DDT) dust were found unsatisfactory for the control of cockchafer adults.

2877. LANDA, V., NOVÁK, K., AND SKUHRAVÝ, V. Pokusy s pozemním poprašováním proti chroustům pomocí DDT a HCH. (Dusting trials with DDT and BHC for cockchafer control.) [Russian summary $\frac{1}{2}$ p.] *Sborn. čsl. Akad. Zeměd.*, 1952, 25: 415-18, bibl. 12.

Dynocide and other DDT preparations were not satisfactory, but BHC (12%) applied at the rate of 50 kg. per ha. gave almost 100% kill of cockchafers.

2878. HAMMOND, G. H. Control of white grubs in Eastern Canada. *Processed Publ. Canada Dep. Agric. Div. Ent.* 88, revised 1953, pp. 6.

Populations of white grubs, *Phyllophaga* spp., damaging permanent turf, nursery stocks, both fruit and ornamental, and strawberries can often be reduced to a safe level by cultural control. When, however, white grub concentrations are dangerous to crops, the use of soil insecticides, particularly BHC at 2.5 lb. of gamma isomer content per acre or DDT at 15 to 30 lb. of active ingredient per acre, is recommended.

2879. GRANOVSKY, A. A. New insecticides control white grubs in strawberries. *Minn. Hort.*, 1953, 81: 53, illus., condensed from *Minn. Fm. Home Sci.*

Trials carried out by the Minnesota Agricultural Experiment Station have shown that very effective control of white grubs, the larvae of June beetles, may be obtained by soil applications of chlordane, aldrin or dieldrin. DDT was ineffective. In commercial strawberry fields dieldrin or aldrin can be used in the form of 2 lb. emulsible concentrates at rates of from $1\frac{1}{2}$ to $2\frac{1}{2}$ gal. per acre in a highly diluted form between the rows. For pre-planting treatment, 20 lb. dieldrin or aldrin 25% wettable powder, or 200 lb. $2\frac{1}{2}\%$ dust, or 25 lb. chlordane 40% wettable powder should be used per acre. The insecticide should immediately be worked into the top 4 or 5 inches of soil.

2880. COCHRAN, J. H. Organic phosphate dusts on the plum curculio. *J. econ. Ent.*, 1952, 45: 1085-7, bibl. 2, being *Tech. Contr. S.C. agric. Exp. Stat.* 199.

Among organic phosphates tested in the laboratory as dusts containing 1.5% active compound on adult plum curculio, *Conotrachelus nenuphar*, EPN and methyl parathion were the most satisfactory. In field trials on peaches EPN and parathion were equally effective when applied in similar concentrations, sprays being slightly better than dusts.

2881. VAN LEEUWEN, E. R. Fumigation of chestnuts with methyl bromide to control weevils. *J. econ. Ent.*, 1952, 45: 1088-9, bibl. 1.

Fumigation of chestnuts with methyl bromide at $2\frac{1}{2}$ to $3\frac{1}{2}$ lb. per 1,000 cu. ft. for 2 to 4 hrs gave very satisfactory control of chestnut weevils, *Curculio auriger* and *C. proboscideus*, and reduced the percentage of germination only slightly or not at all.

2882. FJELDDALEN, J. Rotsnutebille på jordbaer (*Otiorrhynchus ovatus* L.). (The strawberry root weevil.) *Frukt og Baer*, 1953, 6: 65-75, bibl. 16, illus.

The first record of *Otiorrhynchus ovatus* on strawberry in Norway dates from 1939. No further occurrence was reported until 1947, but from 1948 onwards the weevil became a strawberry pest, infesting also conifers. In three years' trials (1950-52) carried out at Lier, Norway, watering the plants in spring with chlordane, lindane or BHC emulsion at the rate of 2 litres/m. row gave good control of the larvae, whereas sprays or dusts applied against the beetles proved unreliable. Plant injuries caused by the pest are described and illustrated and its biology is discussed.

2883. NICKELS, C. B. Control of the pecan weevil in Texas. *J. econ. Ent.*, 1952, 45: 1099-1100, bibl. 3.

Results of spraying experiments against pecan weevil (*Curculio caryaæ*) are inconclusive. Of the chemicals used in soil treatments ethylene dibromide appeared worthy of further consideration.

2884. ANON. New insects keep coming and blueberries have their share. *N.J. Agric.*, 1953, 35 (1): 12.

Blueberries infested by *Cryptorhynchus obliquus*, called the blueberry crown girdler, should be cut down to the ground and the soil fumigated with $\frac{1}{2}$ oz. of paradi-chlorobenzene per plant. For prevention of new infestation 1 oz. of 5% DDT dust should be worked into the soil around the plant.

2885. DELMAS, H. G., AND THERMES, R. Essais de destruction de *Ceratitis capitata* (Wied.) pendant sa vie hypogée. (Control of *Ceratitis capitata* in the soil.) *C.R. Acad. Agric. Fr.*, 1953, 39: 222-6.

Experiments were carried out in the eastern Pyrenees to determine the effectiveness of various soil treatments for the destruction of the pupae of the Mediterranean fruit fly. None of the chemicals tested (chlordane, aldrin, dieldrin, HCH and parathion) gave satisfactory control. Emergence was completely inhibited, however, by daily watering of the soil.

2886. YOTHERS, M. A., WESTLAKE, W. E., AND BUTLER, L. I. Studies on deposits of insecticides used by growers against the cherry fruit fly. (Second report, 1951-1952.) *Proc. 48th annu. Mtg Wash. St. hort. Ass.*, 1952, pp. 213-19, bibl. 1.

In 1951, as in 1950 [see *H.A.*, 21: 2528], residual analyses were made for lead arsenate and methoxychlor

only, but in 1952, when many growers changed to parathion for cherry fruit fly control, more analyses were made of this insecticide than of the 2 former combined. In general speed sprayers gave quite uniform coverage, though in some instances there was a higher deposit on the tops of the trees than on the lower parts and *vice versa*. Hand guns and ground dusters concentrated more of the material on the lower parts of the trees; planes and helicopters gave very uniform coverage. In 1951, where treatments were applied, fair to good control of cherry fruit fly was obtained, and in 1952, when nearly all growers applied the full control programme, practically no infested fruit was harvested, though this was not entirely due to the control measures used.

2887. LEE, N. R.

Note on a plum cambium miner (Agromyzidae).

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 78-9, bibl. 9, illus.

A description is given of damage to young plum trees caused by the larva of an unidentified species of *Dendromyza* not previously recorded in the British Isles. The feeding of the larvae in the cambium causes mines which subsequently become occluded and form pith flecks in the wood; the development of these pith flecks is described. [Author's summary.]

2888. BORDEN, A. D., AND MADSEN, H. F.

Control of stink bug on pears.

Calif. Agric., 1953, 7 (2): 8.

The consperse stink bug, *Euschistus conspersus*, injures maturing pear fruits, causing white corky tissues to develop beneath the skin which turn brown on exposure to air. Good control has been obtained in 2 years by combining the eradication of broad-leaved weeds, on which first generation nymphs develop, with a spring, ground-cover spray application of lindane, dieldrin or a DDT-parathion emulsion. [See also *H.A.*, 22: 3661.]

2889. CHANDLER, S.

Life history and control of the pecan spittle bug.

Rep. 43rd annu. Mtg north. Nut Grs' Ass. 1952, Rockport, Ind., pp. 106-11.

Preliminary trials, carried out at two places in Illinois, showed that *Cercopelta achatina* on pecan is effectively controlled by lindane, BHC and dieldrin. Concentrations used and dates of spraying are specified. Surveys, which are as yet inconclusive, suggest that some varieties are more heavily infested by the pest than others. [Earlier observations by the author on the life history and control of the pecan spittle bug are discussed in the 42nd *A.R. annu. Mtg north. Nut Grs' Ass. 1951*, pp. 18-22, and in *J. econ. Ent.*, 1952, 45: 890.]

2890. DICKER, G. H. L., AND BRIGGS, J. E.

Studies on control of apple sawfly, *Hoplocampa testudinea* (Klug.). I. Effect of time of spraying.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 151-5, bibl. 8.

In field trials carried out during 1949-51 infestations of apple sawfly, *Hoplocampa testudinea* (Klug.) were reduced by 94-100% following the use of 0.0075% or 0.01% parathion at various dates during the two-week

period immediately after 80% petal fall, i.e. from about four days prior to the hatching of the first egg to full hatch. 0.0025% and 0.005% parathion and 0.006% γ -BHC gave satisfactory control up to ten days after petal fall, i.e. to 50% egg-hatch, but were less effective at full hatch. 0.05% nicotine gave variable results when applied at petal fall, was most effective five or ten days later, and ineffective at full hatch. Possible causes for the failure of nicotine are discussed. [Authors' summary.]

2891. THIEM, H.

Pflaumensägewespen (*Hoplocampa minuta*,

H. flava). (Plum sawflies.)

Jber. biol. Bundesanst. Braunschweig 1951, 1952, pp. 73-4.

On the Bergstrasse, southern Germany, ultra-DDT (0.1-0.2%), ultra-Multanin (0.2-0.4%) and E605 (0.02-0.03%) reduced sawfly infestation from an average of 33.0% of the untreated plums to between nil and 5%.

2892. FJELDDALEN, J.

Plommehvespen (*Hoplocampa minuta* Christ).

En orientering om biologi og

bekjempning. (The plum sawfly, *H. minuta*.)

An introduction to its biology and control.)

[English summary.]

Meld. Plantev., 1951, No. 7, pp. 23, bibl. 24, illus., from abstr. in *Rev. appl. Ent.*, 1953, 41: 6.

Hoplocampa minuta is a serious pest of plum in southern Norway. The larvae feed in the young fruits, migrating from one to another, and overwinter in cocoons in the soil. Experiments on control were carried out in 1939-50, the earlier trials being with quassia, nicotine and derris. Tests with preparations of synthetic insecticides were begun in 1945. Parathion (E605) was found to be outstanding, one application at 0.01% after petal-fall proving as effective as one at 0.02% or two applications, one before flowering and one after petal fall. DDT was satisfactory, and a paste preparation proved superior to wettable powders. A proprietary material containing 2.7% BHC, 4% azobenzene and 0.3% parathion was included in one test and gave very promising results at 0.5-1%. None of the preparations caused any injury to the trees.

2893. STAFFORD, E. M., AND JENSEN, F. L.

DDT resistant leafhoppers.

Calif. Agric., 1953, 7 (4): 5, 12.

In field tests, conducted in 1952 by growers and the University of California, Davis, malathion showed great promise for the control of DDT-resistant leafhoppers on vine. Further tests are planned to determine dosage and time of application. Malathion, which is much less toxic to mammals than most other organic phosphates, did not cause any off-flavour in grapes, in spite of its unpleasant odour. The insecticide must not be applied within 2 weeks of harvest.

2894. MUNDINGER, F. G.

Control of pear psylla.

J. econ. Ent., 1952, 45: 934-9, being *J. Pap. N.Y. St. agric. Exp. Stat.* 892.

For the various materials found suitable for late dormant application against pear psylla, *Psylla pyricola*, over 3 seasons, the following dosages are suggested per

100 gal.: 3 quarts of sodium salt of dinitro-o-cresol, 2 quarts of triethanolamine salt of dinitro sec. butyl phenol, 2 gal. of superior dormant oil, 1.25 lb. of parathion (15% w.p.), and 1.25 pt of malathion (50% emulsion).

2895. COLOMBIN, A.

L'évolution des ravageurs des cultures fruitières en fonction du climat. (The evolution of fruit crop pests in relation to climate.)
Congr. pomol. Fr. 1952, being *Suppl. Pomol. franc.*, 1953, pp. 135-51, bibl. 14.

After general remarks on the evolution of insect pests in relation to climate, the annual cycles of *Cydia pomonella* in the neighbourhood of Paris in 1949-51 are discussed in this connexion. The following conclusions regarding *Cydia* are drawn: (1) early hatching of the overwintering generation does not necessarily mean that larval infestation of orchards will be early and intense, as this is strictly controlled by the effect of the climate on egg-laying; (2) the more favourable the climatic conditions for egg-laying and incubation, the earlier the larval infestation; (3) the more favourable the climatic conditions during the first 15 days of flight of the overwintering generation the more intense the larval infestation; (4) the size of the second larval generation is closely related both to the earliness and to the size of the first; (5) climatic conditions being almost always very favourable for egg-laying between 15 July and the end of August, the earlier the hatch of moths the greater the infestation from the second larval generation. From 1 to 5 or 6 treatments in the year are required according to conditions, and it is essential that adequate protection should be given on the eve of important larval hatchings.

2896. FRIEDRICH, G.

Beiträge zur Bekämpfung des Apfelwicklers unter Berücksichtigung des Falterfluges. (Contributions to the control of codling moth, with special reference to moth emergence.)
 Reprinted from *Wiss. Z. Martin-Luther-Univ., Halle-Wittenberg*, 1952-53, 2: 331-7, bibl. 9, illus.

As sprays for codling moth control cannot be accurately timed by the development of the apple tree, a simple method has been worked out for observing the emergence of the moths under practically natural conditions: The bottom of a specially designed wooden box—well illustrated here—is sunk in the soil to a depth of 15 cm., the interior being filled with soil to the same level. Throughout the period of ripening wormy fruits are thrown into the box to be eventually covered with oiled paper and several layers of corrugated cardboard. The gauze lid has an opening through which emerging moths are caught in the spring. If a BHC-DDT spray is used, it should be applied 14 days after the beginning of the flight period and again a fortnight later.

2897. GEIER, P., AND SAVARY, A.

La protection des pommes et des poires contre le carpocapse. (Protection of apples and pears against codling moth.)
Rev. romande Agric. Vitic., 1953, 9: 15-17, bibl. 2, illus.

Experiments on the control of *Cydia pomonella* on apples were conducted near the Lake of Geneva in

1950 and 1952. Pb arsenate was efficacious contrary to the opinion of some that the local populations of *Cydia* were becoming progressively immunized to it, the percentage of infected fruit on trees sprayed with 1% Pb arsenate when the occasion demanded being 3 and 3.1 in the 2 years respectively compared with 16.6 and 9.8 in the controls with Belle de Boskoop, and 6.9 and 5.0 compared with 28.4 and 10.7 with Reine des Reinettes. 1% Pb arsenate was no better than parathion at 20 g. active ingredient per 100 l. water on 6 varieties of apple. Stress is laid on the importance of beginning treatment in good time, of repeating it once or twice at 3-week intervals according to the season of maturity of the variety, and of reducing to a minimum the risk of secondary infection.

2898. PHILLIPS, C. M., BUCHER, G. E., AND STEPHENS, J. M.

Note on preliminary field trials of a bacterium to control the codling moth.
Canad. Ent., 1953, 85: 8, bibl. 2.

A bacterium, *Bacillus cereus*, isolated from diseased larvae of codling moth, *Carpocapsa pomonella*, was found pathogenic to the codling moth in laboratory experiments. At Kentville, Nova Scotia, artificially established codling moth populations sprayed with spore suspensions of *B. cereus* were markedly reduced as a result of infection by the bacterium, which was isolated from all dead larvae found.

2899. MADSEN, H. F., AND BORDEN, A. D.

Insect damage to apricots.
Calif. Agric., 1953, 7 (1): 4-5, illus.

The orange tortrix and codling moth, and, less frequently, the peach twig borer, fruit tree leaf roller, tussock moth, canker worm, diabrotica beetles and certain other pests are apt to damage apricot fruits in California, especially in the Santa Clara valley. The pests are briefly described and the typical damage done by each illustrated. Trials have shown that these insects can be controlled by a petal fall spray of 2 lb. 50% wettable DDD per 100 gal. followed by an application in May of 2 lb. 25% wettable parathion per 100 gal. The proper timing of the latter depends on the use of codling moth bait traps.

2900. GROVES, J. R., AND TEW, R. P.

Preliminary trials for the chemical control of the summer fruit tortricid.
A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 156-8, bibl. 5.

Results from 2 trials suggest that the summer fruit tortricid, *Adoxophyes orana*, may be largely controlled by an application of DNC (0.1%)/petroleum (4%) and/or 0.1% DDT in a winter-spring (delayed dormant-green cluster) spray schedule, followed by summer applications of 0.01% parathion (twice), 0.1% DDT, or 0.15% toxaphene (twice).

2901. GLASS, E. H., AND CHAPMAN, P. J.

The red-banded leaf roller and its control.
Bull. N.Y. St. agric. Exp. Stat. 755, 1952, pp. 42, bibl. 16, illus.

Tests on apple in 1948-51 showed that the red-banded leaf roller, *Argyrotaenia velutinana*, is best controlled in the early larval stage. Treatment for the first brood should be applied at petal fall or about 10 days afterwards and for the second in late July or early August.

Of some 25 insecticides tested, DDD, parathion and Pb arsenate were the best. 1 lb. 50% DDD wettable powder per 100 gal. water controlled the first brood (96-98% mortality) and 1½ lb. the second (87-98%); the residues were toxic to newly hatched larvae for at least 3 weeks after application. 2 lb. 15% parathion powder per 100 gal. water 10 days after petal fall, or 1 lb. at petal fall and 1 lb. 10 days later, controlled the first brood (98%) and 1½-2 lb. the second (87-88%). Pb arsenate was unsatisfactory against the first brood but gave good control against the second brood when applied twice in late July and early August at 3 lb. per 100 gal. water. EPN and Dilan were not fully tested, but gave promising results.

2902. OKUDAI, S.

On the effect of high pressure mercury vapour light traps in controlling the oriental fruit moth. I. [Japanese, with English summary ½ p.]

Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat., 1952, No. 1, pp. 142-58, bibl. 5.

The efficacy of the high pressure mercury vapour light trap in controlling the oriental fruit moth, *Grapholita molesta*, was studied in 1950 and 1951. It was found that (1) far fewer moths were trapped in peach than in pear orchards, females being fewer than males in both cases; (2) there was no peak period of attraction with females but most males were caught 1½-2 hours after sunset; (3) females trapped contained an average of 46 eggs; (4) the male/female ratio in nature is 1/1. The results were inconclusive, since use of the lamp caused no observable decrease in damage in the peach orchard, and was ineffective in one pear orchard, and halved fruit infection within 15 m. of the lamp in another.

2903. BRUNSON, M. H.

Reduction of oriental fruit moth in peach orchards by use of parathion and EPN to control plum curculio.

J. econ. Ent., 1952, 45: 1071-5, bibl. 3.

Both parathion and EPN applied against plum curculio gave very good additional control of oriental fruit moth, *Grapholita molesta*, resulting in a substantial reduction of injured peaches at harvest.

2904. HOERNER, J. L., AND LIST, G. M.

Controlling cherry fruitworm in Colorado. *J. econ. Ent.*, 1952, 45: 800-5, bibl. 8, illus., being *Sci. J. Ser. Colo. agric. Exp. Stat.* 345.

Tests for 5 years based on more than one million cherry fruits show that parathion and methoxychlor are the most promising insecticides for the control of cherry fruit worm, *Grapholita packardi*.

2905. BENDER, E.

Der Wickler *Capua reticulana*. (The tortrix *Capua reticulana*.)

Badischer Obst- u. Gartenb., 1952, 5: 177-8, from abstr. in *Z. PflKrankh.*, 1953, 60: 200.

In 1951 the larvae of *Capua reticulana* caused much damage to apple and pear fruits in certain parts of Western Germany and some damage to plums is also reported. Winter washes proved ineffective, but the addition of DDT, BHC or parathion to the first pre-blossom spray achieved satisfactory control. The biology of the moth is discussed and two other tortrix

species, *Pandemis heparana* and *Cacoecia rosana*, are mentioned as pests of fruit trees.

2906. NEWCOMER, E. J., AND CARLSON, F. W.

The leaf roller moth *Pandemis pyrusana*.

J. econ. Ent., 1952, 45: 1079-81, bibl. 3.

The fruit tree pandemis moth, *P. pyrusana*, a pest of cherries and apricots in the Pacific Northwest since 1948, can be controlled by spraying or dusting with DDT, parathion, TEPP or TDE in April or June.

2907. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

A tussock moth (*Orgyia anartoides*).

Agric. Gaz. N.S.W., 1952, 63: 664, illus.

Notes are given on *Orgyia anartoides*, known as the tussock, the painted wattle or painted apple moth, a pest of apple, apricot, cherry, rose and some garden flowers. Control of the caterpillars is obtained by spraying with 0.1% DDT or 2 oz. Pb arsenate to 4 gal. water.

2908. HÄFLIGER, E.

Neue Entwicklung in der Bekämpfung des Traubenwicklers. (New development in the control of vine cochylis.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 73-4.

The disadvantages of using pure DDT (relatively low toxicity to the pest), and pure parathion (high toxicity to man) suggested trials for combining the two and reducing the individual amounts. The results of trials indicate that the use of 200 g. Gesarol 50+10 g. Etilon in 100 l. water is practicable.

2909. SNAPP, O. I.

Injury to peach trees from propylene dichloride.

J. econ. Ent., 1925, 45: 890.

For the first time in 11 years of work with propylene dichloride emulsion for peach tree borer [*Sanninoidea exitiosal*] control in Georgia, injury to peach trees resulted from use of the quantity recommended. In the opinion of the author the injury was due to wet soil conditions prevailing during the time of the treatment, and low temperatures about a month after the applications may have also contributed to the damage.

2910. DE TOLEDO, A. A.

Notas sobre o contrôle da broca da figueira *Azochis gripusalis*. (Notes on the control of the fig borer, *Azochis gripusalis*.)

Biológico, 1952, 18: 167-9, bibl. 1.

An experiment was carried out during 1951-52 at the Biological Institute, Campinas, to determine the efficiency of various insecticides in controlling the lepidopterous fig borer. DDT 50% wettable powder, chlorinated camphene 40% wettable powder, and lindane 14% emulsion were used at 2 concentrations each. They were applied in 1% bordeaux mixture which is used as a routine spray for leaf rust control. DDT at 0.5% or 0.25% concentration gave complete control of the pest, and considerable control was given by the other two insecticides.

2911. SPATARO, C.

I mandorleti Siciliani colpiti dalla *Malacosoma neustria* in Sicilian almond orchards.

Ital. agric., 1953, 90: 40-4, illus.

Heavy infestation by *Malacosoma neustria* occurred in almond orchards in parts of Sicily in 1948-52. Pb arsenate at 750 g. per 100 l. water gave good control. Cytos (50% DDT) at 0.5% and Lintox (15% gammexane) at 0.25% were used later in the season but were not always successful, as large caterpillars approaching the chrysalis stage proved resistant.

2912. VOGEL, W.

Die Winterspritzung der Kirschbäume unter besonderer Berücksichtigung der Frostspannenschäden im Fricktal. (Winter spraying of cherry trees with special reference to winter moth damage in the Fricktal.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 62-8.

Information is given on winter sprays against winter moth and other pests of cherry and the shot hole fungus [*Clasterosporium carpophilum*] as carried out in North Switzerland. The preparations mentioned are DNC, copper oxychloride and lime-sulphur. The costs of the various winter applications and of pre-blossom and post-blossom insecticides (parathion, DDT, and Gammahexa) are tabulated.

Other pests.

(See also 2948a, 3331.)

2913. JOHANSEN, C.

Mouse control in Yakima and Wenatchee valley orchards with toxaphene.

Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 80-2.

Although no formal recommendations are yet made regarding the use of toxaphene for mouse control, results obtained to date show that 6 lb. per acre applied to tree rows and 8 lb. per acre applied to the entire cover crop are effective. If the cover crop is thick and heavy, higher dosages may be necessary. Perhaps the greatest disadvantage of ground treatment is the toxicity of this insecticide to game birds, domestic animals and humans.

2914. PORRITT, S. W., FISHER, D. V., AND EDGE, E. D.

Mouse control in fruit cold storages by means of carbon monoxide and methyl bromide fumigation.

Proc. Amer. Soc. hort. Sci., 1952, 60: 265-71, bibl. 15, illus., being *Contr. Div. Hort., exp. Fms Serv., Dep. Agric., Ottawa*, 791.

In experiments at Summerland, B.C., it was shown that cold stores could be rid of mice without damage to apples by fumigation with either methyl bromide or carbon monoxide, the latter being supplied from the exhaust fumes of petrol engines.

2915. PORRITT, S. W., EDGE, E. D., AND FISHER, D. V.

Lethal concentrations of carbon monoxide for killing mice in fruit storages as related to length and temperature of exposure and species of mice.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 2.

In general these experiments conducted at the Experimental Station, Summerland, B.C., indicate that

concentrations of 0.07% or more CO might be expected to kill mice within 3 hours at 32° F.

2916. THOMPSON, H. V.

The use of repellents for preventing mammal and bird damage to trees and seed.

For. Abstr., 1953, 14: 129-36, bibl. 101.

This review article discusses the use of repellents to prevent damage to trees and seed by deer, rodents, and birds, especially sparrows, finches and tits. "A summary of the author's conclusions concerning fruit trees follows. Against deer Zn dimethylthiocarbamate-cyclo-hexylamine applied with the adhesive polyethylene polysulphide and other commercial deer repellents have been successful. Against rabbits and hares painting with rosin-ethanol is a valuable preventive, as also are bone oil and the U.S. Fish and Wild Life Service's compound 96a, though the last may injure the tree. Poisoning and cover-destruction are the most favoured methods against rodents and small mammals, but rosin-ethanol against voles (not mice) and Cu naphthenate against porcupines are worth trying. No effective bird repellent has yet been developed."

2917. REICH, H.

Wild- und Nagetierschäden an Obstbäumen.

(Deer and rodent injuries to fruit trees.)

Mitt. Obsib Versuchsring Jork, 1953, 8: 89-90, 95-9, illus.

Of special interest is a method of protecting fruit tree roots against vole damage, illustrated by 6 photographs. A piece of wire netting, 1-1.20 m. long and 50-60 cm. wide, is put in the plant hole before planting. After filling in some soil and shaking the tree for uniform distribution, the ends of the netting are bent towards the collar, thus enveloping the root system. Normal planting proceeds, in the course of which the wire netting is covered.

2918. FREAR, D. E. H., AND WHITE, D. G.

A promising new deer repellent.

Proc. 94th annu. Mtg Pa St. hort. Ass., 1953, 32: 73, bibl. 1, being *Pap. J. Ser. Pa Exp. Stat.* 1782.

From limited data and observations it appears that bone tar oil emulsion at a concentration of about 2 quarts per 100 gal. applied at monthly intervals during the growing season is more effective and probably cheaper than any of the other deer repellents now on the market.

2919. LAFLIN, T.

Bird damage to fruit buds.

Kent Fmr, 1953, 2: 43-6.

Bullfinches and house sparrows sometimes cause severe damage to the buds, mainly the swelling flower buds, of apple, plum, cherry, pear, gooseberry, black and red currants and other trees and shrubs. Notes are given on the type, locality, position, seasonal variation and time of damage. Shooting is an efficient but costly method of control; the shooting of bullfinches is undesirable as half their food consists of seeds, mostly weed seeds. Scaremills probably reduce but do not eliminate damage, while silvered metal devices which bang at intervals are effective for a 3-feet radius. Covering with $\frac{1}{4}$ -inch mesh fish net is very useful in gardens.

2920. DEPARTMENT OF AGRICULTURE FOR SCOTLAND.

Woodpigeons, rooks and carrion and hooded crows.

(Publ.) *Dep. Agric. Scot.*, 1953, pp. 5.

Practical hints are given on the control of these birds by shooting, nest-destruction and trapping.

Antibiotics.

(See also 2839, 2898, 2947r, 2948j, 3188, 3539.)

2921. KRASILNIKOV, N. A., MIRZABEKJAN, R. O., AND ASKAROVA, S.

The application of antibiotics to some plant diseases. [Russian.]

Doklady Akad. Nauk S.S.R., 1951, 79: 1025-7, bibl. 3.

Experiments were carried out with antibiotic substances against cotton gummosis (*Pseudomonas malvacearum*), apricot and peach bacterial wilt (*B. armeniaca*), and fruit necrosis of lemon and mandarin (*Pseudomonas citrusealis*). With regard to apricot and peach wilt, young wildlings and bearing trees infected with the organism were treated by (a) spraying and (b) by injection into the bark. The treated trees rapidly recovered, while untreated trees died. In other tests fruits of lemon and mandarin were inoculated and, when necroses appeared, antibiotics were applied in solution; the necroses were arrested and then disappeared. The authors recognize that these experiments were carried out under special conditions but they foresee the use of antibiotics in field practice.

2922. DÉMÉTRIADES, S. D.

Sur une substance toxique pour les plantes, secrétée par *Sclerotinia sclerotiorum* (Lib.) Massee. (A phytotoxic substance secreted by *Sclerotinia sclerotiorum*.)

Ann. Inst. phytopath. Benaki, 1950, 4: 27-46, bibl. 14, illus. [received 1953].

When the fungus *Sclerotinia sclerotiorum* was cultured on Richard's solution it was found to secrete a toxic substance that caused wilting of potato, tomato, capsicum, fig, pumpkin and vine within about 15 minutes. The plants later became desiccated. The toxicity of the filtrate was considerably reduced at concentrations of 1/5 and 1/10. The toxic substance was thermostable and non-volatile. It was not precipitated by heat. It was precipitated by ethyl alcohol at 95° C., but the toxicity of the precipitate dissolved in distilled water was less than that of the untreated filtrate. This indicates that there are 2 toxic substances, one soluble, the other insoluble in ethyl alcohol; or alternatively that the addition of alcohol causes a molecular change which reduces the activity of the substance.

2923. DELMOTTE, P., AND DELMOTTE-PLAQUEE, J.

A new antifungal substance of fungal origin.

Nature, 1953, 171: 344, bibl. 3.

Ascochyta pisi, *Botrytis cinerea* and *Alternaria solani* were among the fungi inhibited by low concentrations (25-100 p.p.m.) of the active substance in the culture filtrate of a *Monosporium* sp. isolated from a soil sample from the Belgian Congo. The molecular

structure of the new antifungal substance is believed to be closely related to that of mycophenolic acid, an antibiotic extracted from *Penicillium brevi compactum*. —Lab. for Chemical Research, Ministry of the Colonies, Tervuren, Belgium.

2924. CURTIS, P. J., HEMMING, H. G., AND JEFFERY, E. G.

Humicolin, an antifungal substance produced by *Aspergillus humicola*.

Trans. Brit. mycol. Soc., 1952, 35: 263-7, bibl. 6.

Studies are described on the culture of *Aspergillus humicola* and on the extraction, properties, stability and biological activity of humicolin. This antibiotic showed marked inhibitory activity against many fungi, including *Botrytis allii*, and against certain bacteria.

Fungicides and insecticides.

(See also 2588, 2947e, f, i, j, n, 3091, 3390 l.)

2925. JACKS, H., AND OTHERS.

Orchard spray trials in 1951-52.

Suppl. Orchard. N.Z., December 1952, pp. ii-viii, bibl. 2.

The results are summarized of 49 experiments on pest and disease control in apples (35 tests), pears (2), peaches (3), plums (1), citrus (2), grapes (3), hops (2), tomatoes (1).

2926. KIRBY, A. H. M.

Common names for chemicals.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 185-6.

A list is provided of the official common names and chemical names, approved for the British Standard list, up to the end of 1952, of certain insecticides, fungicides, herbicides and rodenticides.

2927. (COMMONWEALTH INSTITUTE OF ENTOMOLOGY.)

The nomenclature of chemicals used for pest control.

Rev. appl. Ent., 1953, 41: 1-3.

The common names of insecticides recommended by British, Canadian and American standard committees are listed with the corresponding chemical names or definitions and some other names. If additions or changes become desirable, they will be given in the first number of each volume of the *Review*.

2928. CINQ-MARS, L., AND COULSON, J. G.

Effects of fungicides on crop plants.

Agric. Inst. Rev., 1953, 8 (2): 54-6, 61, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa*, 1245.

The limitations or secondary effects of fungicidal applications to fruit and vegetables are discussed.

2929. KIRBY, A. H. M., AND FRICK, E. L.

Modifications in the glass-slide spore-germination test for use in fungicide research.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 161-7, bibl. 17.

Modifications in the glass-slide germination technique of Montgomery and Moore [see *H.A.*, 8: 100] are

described, for use especially with *Venturia* spp. Slides with circular grooves having sharp edges to the inner circle are advocated, and the methods of cutting these are outlined. Twelve surfactants were compared with a standard sulphite lye solution, for wetting, rewetting, and inhibition of spore germination. Triton X100, Triton X155, and Lissapol NXA proved the most successful. Methods of providing spores for suspension, and the negligible effect on germination of centrifuging these suspensions even at high speeds, are described. Increase in percentage germination has been shown to occur in suitable nutrient solutions over that obtained in de-ionized water only. Spore germination in nutrient solution was almost complete at 6 hours, whereas in the presence of cupric ions germination progressed up to 42 hours. Counting has been simplified and made less fatiguing by the use of the Vickers Projection Microscope. [Authors' summary.]

2930. TANAKA, S.

Studies on the fungitoxicity of copper sprays. [Japanese, with English summary 1 p.]

Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat., 1952, No. 1, pp. 105-27, bibl. 95, illus.

With *Alternaria kikuchiana* as indicator the fungicidal properties of some 40 Cu sprays were compared by inoculation of pear fruits and by spore germination tests *in vitro*. *Inoculation tests*. The most toxic sprays were Cu oxalate, bordeaux mixture, cuprous oxide, CuAl sulphate plus Na carbonate, and CuAl sulphate plus Ca hydroxide. Some Cu silicate sprays were relatively toxic, but Cu oxychloride, Cu phosphate, basic Cu sulphate and copper soap were less effective. *Spore germination experiments*. The most toxic sprays were Cu oxalate, basic Cu sulphate plus organic Hg, CuAl sulphate plus Na carbonate, bordeaux mixture, CuAl sulphate plus Ca hydroxide, cuprous oxide and Cupoid. Cu silicate, Cu phosphate, Cu arsenate, Cu oxychloride, basic Cu sulphate, Cu resinate, copper soap and Cu cyanide had rather low toxicity. Dipping the slides in distilled water greatly reduced the toxicity of CuAl phosphate plus Na carbonate, only slightly affected that of bordeaux mixture, Cu oxalate and cuprous oxide, and often increased that of Cu silicate.

2931. COX, J. A.

How growth and yield of Concord grapes are affected by DDT-bordeaux mixes.

Agric. Chemis., 1953, 8 (3): 37-9, 151-4, bibl. 7, illus.

Although the tests cover a period of only two years, the data presented on vine growth and fruit yield indicate that sprays of bordeaux mixture alone and sprays of DDT and bordeaux mixture retard the vegetative growth of the vine and reduce the yield. The addition of DDT to bordeaux increases the effect. In 1952, grapes sprayed with DDT and bordeaux mixture yielded 1.6 tons less fruit per acre than grapes treated with DDT and ferbam. The data indicate that early season applications of bordeaux mixture are more injurious than late ones. It would seem that sprays of bordeaux mixture inhibit the food manufacturing ability of the leaves even though there is no apparent injury. [From author's summary.]—Pennsylvania State College.

2932. CIFERRI, R.

Ricerche di laboratorio e prove di campo con insetticidi sistemicci fosfororganici. (Laboratory and field experiments with phosphoric systemic insecticides.) [English summary 16 lines.]

Riv. Ortoflorofruttic. Ital., 1953, 37: 1-9.

The results are given of 2 years' laboratory and field experiments at Pavia Plant Diseases Laboratory with phosphoric systemic insecticides, chiefly the non-fluorinated groups as exemplified by pestox 66 and systox. They were found to stimulate plant growth. They were efficacious against a number of aphids and mites but not against *Phylloxera* in the field. Efficacious spray concentrations were 0.15-0.2% on pomes and 0.1-0.15% on drupes. Spraying should take place soon after petal fall, it may be repeated once for apples and twice for peaches and other drupes, but it should not be done within 3 weeks of harvesting. The insecticidal period with pestox 66 was 2-3 weeks against aphids and 3-4 against mites; that of systox was 1-1½ weeks against aphids and 2 against mites. Penetration of the insecticide was not complete until 24 hours after application and respraying should occur if more than 2 mm. rain falls during this period.

2933. PIANKA, M.

Sytam, a new systemic insecticide.
World Crops, 1953, 5: 117, bibl. 3.

Notes are given on sytam, a new quick-acting systemic insecticide with no contact insecticidal activity, which is based on schradan (bisdimethylaminophosphorous anhydride). The quick-acting property (24 hours for hop blight and red spider) is due to the inclusion of non-insecticidal, non-oxidizing activators which enhance the insecticidal activity.

2934. KRINER, E. R., DEWEY, J. E., AND NORTON, L. B.

Orchard evaluation of DDT formulations and DDT-acaricide combinations.

J. econ. Ent., 1952, 45: 957-65, bibl. 10.

Results are given of 6 field experiments conducted in New York apple orchards to compare "fused" (Barden clay and tobacco) and conventional formulations of DDT and DDT+acaricide (parathion, EPN and DMC) combinations for the control of apple pests including codling moth, red-banded leaf roller and mites. From the mass of data presented the DDT+parathion combination appears to be generally the most satisfactory.

2935. BARTLETT, B. R., AND ORTEGA, J. C.

Relation between natural enemies and DDT-induced increases in frosted scale and other pests of walnuts.

J. econ. Ent., 1952, 45: 783-5, bibl. 5.

In Southern California, increases in populations of walnut aphid, *Chromaphis juglandicola*, two-spotted spider mite, *Tetranychus bimaculatus*, European red mite, *Paratetranychus pilosus*, and frosted scale, *Lecanium pruinosum*, are associated with decreases in the populations of natural enemies of these insects caused by DDT spray residues. Ordinarily DDT sprays for codling moth are applied during the period when they are least detrimental to parasite activity,

but heavy dosages and double treatments dangerously extend the duration of harmful residual action.

2936. MACPHEE, A. W.

The influence of spray programs on the fauna of apple orchards in Nova Scotia. V. The predacious thrips *Haplothrips faurei* Hood.

Canad. Ent., 1953, 85: 33-40, bibl. 6.

Haplothrips faurei is an important predator of several major apple pests, including European red mite, clover mite, codling moth, and eye-spotted bud moth. In this paper results are given of studies made to facilitate the development of a spray programme harmless to this species. Of the chemicals commonly used in Nova Scotia, DDT, parathion and BHC practically eliminate the thrips populations and sulphur causes a marked reduction. A further group of sprays, including the fungicides Phygon and Tag and the insecticides cryolite, nicotine sulphate, and summer oil, caused some reduction in the number of thrips, while the fungicides ferbam, copper mixture and Crag Fruit Fungicide (341C) as well as the arsenical insecticides and fixed nicotine appeared harmless to it.

2937. BRUNSON, M. H., AND KOLBLITSKY, L. Parathion, DDT and EPN deposits on peach foliage and fruit.

J. econ. Ent., 1952, 45: 953-7, bibl. 5.

Studies were made in 1950 and 1951 in New Jersey, of the loss of parathion, DDT and EPN residues from Summercrest and Elberta peach leaves and immature fruit, residues on fruit at harvest and the effectiveness of these insecticides in different spray schedules to control oriental fruit moth, *Grapholita molesta*, in ripe fruit. Parathion and EPN were lost at a considerably lower rate from fruit than from leaves, but DDT was lost from fruit and leaves at about the same rate. The average residues on ripe fruit 2 and 3 weeks after application were parathion 0.24 and 0.10 p.p.m.; DDT 6.4 and 5.9 p.p.m.; and EPN 0.52 and 0.36 p.p.m. respectively. There was no significant difference between the effectiveness of the spray schedules tested; the average reduction of ripe fruit injury was 84.1%. [From authors' summary.]

2938. CLARK, P. J., AND OTHERS.

Selenium content of apples.

N.Z. J. Sci. Tech., Sect. B, 1953, 34: 245-7.

Since 1947 many analyses have been carried out on apples treated with Selocide by different methods. Spring applications for 5 years caused no progressive accumulation of Se in apples. The Se content of the pulp and the residue on the skin increased when the number of spray applications throughout the season was increased.—D.S.I.R., Wellington and Auckland.

Spray apparatus and technique.

(See also 2947v, 2948i.)

2939. WENZL, H.

Untersuchungen über Grundfragen der Winterspritzung im Obstbau. (Investigations on some basic problems in the applications of winter washes.)

Bodenkultur, 1952, 6: 346-54, bibl. 2.

In order to study the coverage of winter washes, dead

half-standard apricot trees were sprayed with milk of lime and the untreated area was determined after felling. The addition of wetters was shown to have no influence on the result. Laboratory trials carried out later proved the applicability to winter washes of the data obtained with milk of lime. The author found that (1) the tips of the shoots and the under-side of the lower, horizontally growing branches were insufficiently covered; (2) the proportion of untreated area (mostly 3-10%) was reduced by increasing the amount of spray above that normally applied, but complete coverage was not achieved; (3) wind was the most important factor determining the degree of coverage, a wind as low as 8-12 miles per hour rendering the complete treatment of the lee side impossible, however carefully the spraying was carried out. Calculated data on percentage pest survival at degrees of coverage ranging from 100% to 80% and degrees of spray efficacy ranging from 100% to 90% are tabulated. At 95% coverage and spray efficacy, for instance, pest survival would be 9.7%, as against 5.9% at 97% coverage and efficacy.—Bundesanstalt f. Pflanzenschutz, Vienna.

2940. ROBERT, E.

Emploi des adjuvants dans les produits antiparasitaires utilisés en arboriculture fruitière. (The use of adjuvants in antiparasitic products employed on fruit tree crops.)

Congr. pomol. Fr. 1952, being *Suppl. Pomol. franç.*, 1953, pp. 217-38.

Adjuvants are discussed under the following headings: diluents, spreaders, colorants, odoriferous products, synergists and buffers. Notes are given on their use.

2941. NEUDERT, W., AND BRUNN, R.

Die Messung der Benetzbarkeit von Pflanzenblättern mit Hilfe des Tropfenspreitungs (TS-) Testes. (Measuring the wettability of plant leaves by means of the drop spreading test.)

NachrBl. dtsch. PflSchDienst., Braunschweig, 1953, 5: 39-43, bibl. 2, illus.

The tests were carried out on apple, pear, walnut, kohlrabi, maple and mahonia leaves.

2942. MARSHALL, J.

Use of concentrate sprays in orchards.

Agric. Inst. Rev., 1953, 8 (2): 67-9, bibl. 9, illus., being *Contr. Div. Ent., Sci. Serv., Dep. Agric.*, Ottawa, 3056.

About 90% of the orchard acreage in British Columbia is now sprayed with concentrates. The most effective type of machine used develops an axial-flow airstream, is capable of applying efficiently all dormant and summer sprays, and is satisfactory for chemical thinning.

2943. MOORE, M. H.

Concentrate spraying in fruit plantations: a review of experiments with lime-sulphur.*

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 132-5, bibl. 5, illus.

Experiments on small Cox's Orange Pippin apple trees have established that 100% and 50% lime-sulphur concentrate can safely and effectively be applied to

* Modified version of paper presented to IIIe Congrès international de Phytopharmacie, Paris, September, 1952.

foliage and fruits when it is uniformly dispersed and deposited in small, discrete droplets in an impelled airstream. Excessive deposit, especially on the lower leaf-surfaces, resulted in severe leaf-scorch. These conclusions are supported by observations on large trees, where the problem is mainly one of depositing the fungicide in the required manner. [Author's summary.]

2944. PEYER, E., AND MÜLLER, O.

Anforderungen an die Spritzgeräte im Rebbau und vergleichende Erhebungen über stationäre Spritzanlagen mit Hochdruckspritzen. (Spraying apparatus in viticulture and a comparison of low pressure spraying with high pressure spraying.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 69-73.

The various spraying methods used in vineyards, viz. (1) single plant, (2) row, and (3) area spraying, are discussed. Methods and costs are compared, with reference to stationary spraying plants for low concentrate sprays and portable apparatus for high concentrate sprays.

2945. SALLER, W.

Einfluss verschiedener Schädlingsbekämpfungsmittel auf die Gärung. (The effect of several plant protective chemicals on fermentation.) [English summary 5 lines.]

Mitt. Klosterneuburg, 1953, 3: 51-6, illus.

Two mercurial fungicides and a proprietary spreader applied to vine must were found to inhibit fermentation, while EPN 300 and two DDT-BHC mixtures had no adverse effect.

Pest control by electricity.

2946. THOMAS, A. M.

Pest control by high-frequency electric fields—critical résumé.

Tech. Rep. elect. Res. Ass. W/T23, 1952, pp. 40, bibl. 149, illus., 24s.

An account is given of the physical and mathematical theory of pest control by high-frequency electric fields and of its practical applications, together with a review of the literature and some suggestions for further experimental investigation. The disinfection of many kinds of biological substances, such as fruits, vegetables, grain, seeds and stored products, can be achieved by this method. Experimental observations strongly favour the assumption that pests are destroyed as a result of excessive rise in temperature; the existence of a "specific effect" is improbable. Under favourable conditions differential heating effects are possible, whereby the pest can be destroyed without injury to the host. In the case of destruction of eelworms in bulbs the conditions are unfavourable, since an adequate differential heating effect is unobtainable with unmodulated high-frequency fields; in such a case there is evidence that a high intensity, pulse-modulated, high-frequency field might be successful. The use of high-frequency magnetic fields for heating biological material is feasible but less effective and convenient than high-frequency electric fields. The running, maintenance, replacement and amortization costs of high-frequency disinfection are comparable with

conventional fumigation methods. In special cases the convenience and speed of the method will often outweigh the higher cost.

Noted.

2947.

a ANON.

1953 spray recommendations for tree fruits in eastern Washington.

Ext. Bull. Wash. St. agric. Ext. Serv. 419, revised 1953, pp. 29, illus.

b ASQUITH, D.

The periodical cicada [*Magicicada septendecim*] in Pennsylvania orchards.

Progr. Rep. Pa agric. Exp. Stat. 88, 1952, pp. 3, bibl. 6, illus.

c BAKER, H.

Insect enemies of northern tree nuts.

Rep. 43rd annu. Mtg north. Nut Grs' Assoc. 1952, Rockport, Ind., pp. 112-17.

d BÖMEKE, H.

Gedanken über die Glasigkeit bei Äpfeln. (Glassiness or water-core of apples.)

Mitt. Obstb. Versuchsring Jork., 1953, 8: 20-2.

e BYRDE, R. J. W., CROWDY, S. H., AND WOODCOCK, D.

Studies on systemic fungicides. III. The activity of certain chlorine-substituted β -naphthols and naphthoxy-*n*-aliphatic carboxylic acids as systemic fungicides.

Ann. appl. Biol., 1953, 40: 152-65, bibl. 9.

f CHAMBERLAIN, G. C.

The use of fungicides on stone fruits.

Agric. Inst. Rev., 1953, 8 (2): 34-5, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa*, 1234.

To control brown rot, leaf curl, black knot and leaf spot.

g CHRISTIE, J. R., AND TAYLOR, A. L.

Controlling nematodes in the home garden. *Fmr. Bull. U.S. Dep. Agric.* 2048, 1952, pp. 11, illus.

h COLLYER, E.

Beneficial fruit insects: predators 1, 2 and 3. *Grower*, 1953, 39: 635, 735 and 837, all illus.

Black-kneed capsid, *Blepharidopterus angulatus* [see also *H.A.*, 22: 1385], anthocorid bugs, and ladybirds and lacewings respectively.

i COLLYER, E.

The effect of spraying materials on some predatory insects.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 141-5, bibl. 10.

Predators of fruit tree red spider mite in Essex.

j DUSTAN, G. G.

Use of insecticides on fruit crops.

Agric. Inst. Rev., 1953, 8 (2): 10-11, 14, bibl. 1, illus., being *Contr. Div. Ent., Sci. Serv., Dep. Agric. Ottawa*, 3142.

PLANT PROTECTION OF DECIDUOUS FRUITS

k ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.
The grape-vine moth (*Phalaenoides glycine*).
Agric. Gaz. N.S.W., 1952, 63: 663-4, illus. And its control.

l EVENHUIS, H. H.
Bepaling van de tijdstippen waarop tegen het fruitmotje, *Enarmonia (Carpocapsa) pomonella* L., gespoten moet worden. (Determination of the dates of spraying against codling moth.) [English summary 2 p.]
Tijdschr. PlZiekt., 1953, 59: 9-22, bibl. 7, illus.

m FRANCO DO AMARAL, J.
Principais doenças das plantas cultivadas no estado de São Paulo e seus respectivos tratamentos. (The principal diseases of plants cultivated in the State of São Paulo [Brazil] and their control.)
Biológico, 1951, 17: 179-88.
Very brief control recommendations for the diseases of 40 crop plants.

n GAST, —.
Le développement des insecticides systémiques et les résultats de nouveaux produits d'essai à base d'uréthanes et d'esters phosphoriques. (The development of the systemic insecticides and the results of tests with [3] new urethane and [3] phosphoric ester insecticides.)
Congr. pomol. Fr. 1952, being *Suppl. Pomol. franç.*, 1953, pp. 177-82, bibl. 2.

o HEY, G. L.
The control of minor fruit pests and diseases. *Comm. Grover*, 1953, No. 2992, pp. 909-10, illus.
Summer fruit tortrix, woolly aphis and dock sawfly.

p HOCKEY, J. F.
Safeguarding Canada's apple crop.
Agric. Inst. Rev., 1953, 8 (2): 39-40, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa*, 1236.
Methods of disease control briefly outlined.

q KITAJIMA, H.
Studies on peach anthracnose. [Japanese, with English summary 2 1/2 pp.]
Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat., 1952, No. 1, pp. 72-104, bibl. 32, illus.
Epidemiology of *Gloeosporium laeticolor*.

r KÖHLER, H.
Antibiotika und ihre Bedeutung in der Pflanzenpathologie, I, II and III Teil. (Antibiotics and their significance in plant pathology. Parts I, II and III.)
NachrBl. dtsch. PflSchDienst, Berlin, 1950, 4: 161-4, 185-93, bibl. 64; 1953, 7: 12-18, bibl. 30; and 7: 72-80, bibl. 40.

s KRAUSE, G.
Versuche über die aktive Ausbreitung der San José-Schildlaus. (Studies on the active spread of San José scale.)
Z. PflBau-u-Schutz, 1951, 2: 271-83, from abstr. in *Z. PflKrankh.*, 1953, 60: 199.

t KRAUSE, W. G. C.
Little-known virus: stony pit in pears.
Comm. Grover, 1953, No. 2990, pp. 803-4, illus.

u VAN LEEUWEN, E. R.
Life history and habits of the chestnut weevils.
J. econ. Ent., 1952, 45: 1089-91, bibl. 1.

v MARSHALL, J.
More about concentrate spraying.
Proc. 48th annu. Mtg Wash. St. hort. Ass., 1952, pp. 72-9, bibl. 5.
With special reference to British Columbia and Washington.

w MASSEE, A. M.
Notes on some interesting insects observed in 1952.
A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 146-50.
Insects and mites noted on fruit in Kent.

x MICHELBACHER, A. E., BACON, O. G., AND WADE, W. H.
Codling moth on walnuts.
Calif. Agric., 1953, 7 (3): 7, 15, illus.
Tests with DDT, lead arsenate, etc, For earlier report see *H.A.*, 22: 3682.

y MINISTRY OF AGRICULTURE, LONDON.
Black currant gall mite.
Adv. Leafl. Minist. Agric. Lond. 27, revised 1953, pp. 4, illus.
Phytoptus (= *Eriophyes*) *ribis*.

z MINISTRY OF AGRICULTURE, LONDON.
Apple and pear scab.
Adv. Leafl. Minist. Agric. Lond. 245, revised 1953, pp. 6, illus.

2948.

a MINISTRY OF AGRICULTURE, LONDON.
The woodpeckers.
Adv. Leafl. Minist. Agric. Lond. 197, amended 1952, pp. 4, illus.

b NOLTE, H.-W.
Schlitzblättrigkeit als Folge von Himbeerkäfer-Frass. (Slit leaves resulting from feeding of the raspberry beetle [*Byturus tomentosus*.])
Reprinted from *Anz. Schädlingsk.*, 1952, 25: 170-1, bibl. 10, illus.

c PICKETT, A. D.
Controlling orchard insects.
Agric. Inst. Rev., 1953, 8 (2): 52-3, illus., being *Contr. Div. Ent., Sci. Serv., Dep. Agric., Ottawa*, 3044.
By natural and chemical means.

d PIERI, G.
Per una piu' razionale lotta antiperonosporica. (Towards a better control of vine downy mildew.)
Riv. Vitic. Enol., 1953, 6: 69-75, bibl. 6.
[For another version see *H.A.*, 23: 1686.]

e SCOTT, W. J.
Mould wastage in stored fruit.
Food Pres. Quart., 1952, 12: 21-5, bibl. 4.

f SHARVELLE, E. G., VANDEMARK, J. S., AND BURKHOLDER, C. L.
Control in-transit losses of fruits, vegetables.
65th A.R. Purdue Univ. agric. Exp. Stat. Ind. 1951/52, 1952, pp. 36-7.
See *H.A.*, 22: 2348 for article in *Science* on same work.

g STANTON, W. R.
Breeding pears for resistance to the pear scab fungus *Venturia pirina* Aderh. I. Variation in the pathogenicity of *Venturia pirina*. II. The study of field resistance on selected pear seedlings and the inheritance of resistance in seedling pear families under controlled conditions.
Ann. appl. Biol., 1953, 40: 184-91, bibl. 27; 192-6, bibl. 11.

h STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Specialpræparater til sommersprøjning mod skurv på æble og paere. (Special fungicides for summer spraying against apple and pear scab.)
Erhversfrugtavl., 1953, 19: 203-5, being Medd. Stat. Forsøgsvirks Plantekult. 443.

i SYLVÉN, E.
Några synpunkter på metodik vid bekämpningsförsök. (Some points concerning the lay-out of trials for pest control by insecticides.)
Växtskyddsnotiser, 1952, No. 4, pp. 51-3, illus.
The author's suggestion is illustrated by a schematic drawing.

j THOMPSON, W. R.
Biological control.
Agric. Inst. Rev., 1953, 8 (2): 47-8.
A discussion.

k VOGEL, W.
Die Bekämpfung der Kirschenfliege im Jahre 1953. (The control of cherry fruit fly [in Switzerland] in 1953.)
Schweiz. Z. Obst- u. Weinb., 1953, 62: 87-91, illus.

WEEDS AND WEED CONTROL.

General.

(See also 3027, 3230.)

2949. CRAIG, H. A.
Cultural and other control methods of persistent perennial weeds.
Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 17-18.

Work conducted by the Manitoba Weeds Commission indicates 4 methods of control of persistent perennial weeds, depending on the extent of infestation and soil type. They are the use of chemicals, intensive cultivation, grazing with sheep, and land quarantine.

2950. PRIDHAM, A. M. S.
Chemical weed control in the nursery.
Amer. Nurserym., 1951, 94 (4): 12, 65-6 [received 1953].

Possible methods of weed control during various seasons of the year are discussed. At present chemical weed control is not advisable during the growing season except where special machinery is available to protect the plants from contact with the herbicide. Chemicals are likely to prove valuable during the dormant season.

2951. HEMPHILL, D. D.
CMU as a herbicide for horticultural crops.
Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 70-1.

Gladioli, grapes and peas showed considerable tolerance to concentrations of CMU which gave satisfactory control of annual broad-leaved and grassy weeds.

Particular weeds.

2952. SEXSMITH, J. J., AND OTHERS.
Effect of chemicals on persistent perennials.
Proc. and Abstr. 5th west. Canad. Weed Control Conf., 1951, Vancouver, 1951, pp. 93-106 [received 1953].
A total of 14 abstracts are given, covering tests with a wide variety of hormone-type chemicals and soil sterilants on toad flax, leafy spurge, hoary cress and horsetail.

2953. DAVIDSON, J. G., AND OTHERS.
The effect of chemicals on annuals and common perennials.
Proc. and Abstr. 5th west. Canad. Weed Control Conf., 1951, Vancouver, 1951, pp. 76-93 [received 1953].
Ten workers contributed to this section dealing mainly with the control of annual weeds.

2954. MOORE, R. J., AND LINDSAY, D. R.
Fertility and polyploidy of *Euphorbia cyparissias*.
Canad. J. Bot., 1953, 31: 152-63, bibl. 20, illus.
The European cypress spurge, originally introduced to North America as an ornamental, is now firmly established as a weed in Eastern Canada. The distribution of diploid and tetraploid plants is mapped from herbarium specimens, the two types being distinguished by the size of cells of the upper leaf epidermis. The diploids appear never to set seed, whereas the tetraploids are highly fertile. The milky juice of the plants is toxic to cattle and some of the infestations have reached serious proportions.

2955. BLANCHARD, —.

Contribution à l'étude de la biologie de l' *Orobanche* et à sa destruction. (Contribution to the study of the biology and control of *Orobanche*.)

Ann. Inst. agric. Algér., 1952, 6 (9): 1-49, bibl. 21, illus.

Among the vegetable plants grown in Algeria those chiefly parasitized by *Orobanche speciosa* are peas, beans and lentils. The biology of the parasite is described. In control experiments in pea crops 3 different treatments were applied: (1) peas alone, (2) peas plus *Orobanche* seed at 1 g. per 5 m. of row, (3) peas plus *Orobanche* seed as above plus soprasan (methoxyethylmercury silicate) at the base of the furrow at rates ranging from 150 to 975 kg. per ha. The lowest rate gave the best results, limiting the parasite to 1 plant per 5 m. compared with 24 in peas alone and 198 in peas plus *Orobanche* seed. There was, however, little difference between yields of treated peas and peas alone. Soprasan gave similar results with lentils.—Stat. centr. Essais Semences et d'Amé. Plantes, Maison-Carrée, Algérie.

Control of grasses.

2956. CARDER, A. C., AND OTHERS.

Effect of chemicals on weedy grasses.

Proc. and Abstr. 5th west. Canad. Weed Control Conf., 1951, Vancouver, 1951, pp. 106-24 [received 1953].

For the control of couch or quack grass TCA was found practical only for spot treatment, but CMU showed promise for general application. Against wild oats, the worst weed in Canada, TCA, CMU and maleic hydrazide were ineffective, irrespective of rate or time of application. Experiments indicated good control of green foxtail with 10 lb. of TCA and 20 lb. of maleic hydrazide per acre.

2957. ÅBERG, E., KNUTSSON, G., AND ROLAND, M. Triklorättiksyrans verkan på ogräs och kulturväxter. (The action of TCA on weeds and cultivated plants.) [English summary $\frac{1}{2}$ p.]

Växtodling, 7, 1952, pp. 11-24, bibl. 10.

Experiments on the control of couch grass (*Agropyron repens*) with sodium trichloroacetate (exclusively used since 1950), trichloroacetic acid and chloral hydrate were carried out 1948-51, peas being among the crops treated. The effect of the herbicides on the crop plants was also studied. An application of 50 kg./ha. of 90% sodium TCA was shown to kill couch grass on newly worked soil, while 100 kg. were needed against established stands of the weed. The residual effect of the chemical in the soil had usually disappeared by April or May if the treatment was applied in summer, not later than August.

2958. SPEIR, W. H., AND STEPHENS, J. C.

Herbicultural tests for control of para grass on ditch banks in the Everglades region of Florida.

Weeds, N. York, 1953, 2: 15-23, bibl. 6, being *J. Ser. Fla agric. Exp. Stat.* 96.

CMU was found the best but most expensive chemical for the control of para grass, *Panicum barbinode*.

A "pre-weakening" method, consisting of a preliminary treatment with a cheap contact herbicide or hot flame, followed up by light dosages of TCA, polybor-chlorate or CMU 3 to 6 weeks later, was developed and seemed promising.

2959. BURGIS, D. S., AND COWPERTHWAITE, W. G.

Report on the use of chemical weedkillers for nutgrass control.

Proc. Fla St. hort. Soc. for 1952, pp. 163-5, bibl. 2, illus., being *J. Ser. Fla agric. Exp. Stat.* 108.

In 2 series of experiments carried out in 1952 several new herbicides were tested for control of nutgrass (*Cyperus rotundus*). In the first, a single application of CMU (3-p-chlorophenyl)-1,1-dimethyl urea) was as effective as two applications of 2,4-D and superior to TCB (methyl trichlorobenzoate), Crag Herbicide 1 (2,4-dichlorophenoxyethyl sulphate), and naphthyl phthalamic acid. In the second series CMU was significantly better than phthalamic acid but not than MCPA.

Control of woody plants.

(See also 2999a, f, k, r.)

2960. SUGGITT, J. W.

Recent research in chemical brush control.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 59-63.

I. Foliage spraying of resistant woody plant growth. Ammate at a concentration of 0.75 lb. per gal. appears to be an effective non-selective spray, but because of its high cost, bulkiness and corrosiveness to equipment it is a less attractive spray material than mixtures of 2,4-D and 2,4,5-T. For susceptible species 0.15-0.25% sprays of 2,4-D+2,4,5-T (1:1) were found sufficient, but against resistant species 0.25-0.35% concentrations are recommended. The most effective time for the application of foliage sprays is from 20 to 70 days after bud-break. Notes are given on the effect of increased proportions of 2,4,5-T in the phenoxy mixtures.

II. Dormant season basal bark treatment of woody species. 1.2 to 1.5% concentrations of 2,4,5-T in an oil carrier appear to be the most potent and economical sprays for dormant basal bark application. For the control of many resistant species, such as maple, ash and oak, bark treatments are more satisfactory than foliage sprays.

2961. PLAYFAIR, L., AND OTHERS.

Effect of chemicals on woody growth.

Proc. and Abstr. 5th west. Canad. Weed Control Conf., 1951, Vancouver, 1951, pp. 125-35 [received 1953].

The 9 abstracts given show the reaction of various woody species to 2,4-D, 2,4,5-T and their mixtures. The response appears to depend upon the formulation of the herbicide used and the species and age of growth under treatment.

2962. OFFORD, H. R., AND OTHERS.

Improvements in the control of ribes by chemical and mechanical methods.

Circ. U.S. Dep. Agric. 906, 1952, pp. 72, bibl. 25, illus.

Control by 2,4-D and 2,4,5-T or a specially equipped crawler tractor are discussed in detail. *Ribes* eradication is of economic importance in the United States in view of its relation to white pine blister rust.

2963. AREND, J. L., AND COULTER, L. L.

Chemical frill girdling for pine release in Lower Michigan.

Down to Earth, 1953, 8 (4): 2-4, bibl. 3, illus.

Winter chemical frill girdling and the usual axe-girdling method (double hack girdle and notch girdle) were compared in Lower Michigan as a means of killing back trees of 5 hardwood species of 4-24 in. breast height diameter. At the end of the first growing season after treatment the tops of all the axe-girdled trees were dead and those of a large proportion of the chemical frill girdled trees were either dead or dying; almost all the axe-girdled trees had developed 10-20 sprouts, about 3 feet long but only about half the chemical frill girdled trees had developed weak sprouts about a foot long. The chemical method cost about half as much as the other. The procedure is to frill girdle the tree and wet the cut surface with 4 lb. 2,4,5-T acid equivalent per 100 gal. diesel oil (1% by volume of Esteron 245 in diesel oil). Trees too small to frill girdle are either basally sprayed or cut close to the ground and the top and sides of the stump then thoroughly wetted with a 3% solution of Esteron 245 in oil.

Weed control in fruit crops.

2964. ANON.

Geese for weed control in strawberry fields.
Amer. Nurserym., 1951, 94 (4): 40-1 [received 1953].

Five to seven geese per acre are very valuable for keeping down weeds, especially crab grass, in first-year strawberry fields. In cropping fields they can be used until blossoming starts.

2965. ROBERTS, W. W., AND HEMPHILL, D. D.

Weed control in horticultural crops. I. Chemical weed control in strawberries.
Res. Bull. Mo. agric. Exp. Stat. 491, 1952, pp. 33, bibl. 38, illus.

A comprehensive review of recent literature on weed control on strawberries is followed by an account of the results of greenhouse tests in Missouri in the early spring of 1950. In field trials conducted during the same year, among 5 herbicides used maleic hydrazide and endothal were found unsuitable for strawberries. 2,4-D was satisfactory and can be used safely as a pre-planting treatment at the rate of 2 to 4 lb. per acre, and applied to the leaves from 4 weeks after planting to 15 August at 1 to 1½ lb. per acre, and again in the autumn after fruit bud differentiation and in the early spring when the winter mulch is removed. Sodium 2,4-dichlorophenyl "cellosolve" sulphate and perhaps dichloral urea could be applied at times when 2,4-D is unsuitable, but there are problems arising from the use of these 2 chemicals which need further investigation.

2966. FREEMAN, J. A., AND OTHERS.

Effect of chemicals on small fruits.

Proc. and Abstr. 5th west. Canad. Weed Control Conf., 1951, Vancouver, 1951, pp. 73-6 [received 1953].

The results of the few investigations carried out in Western Canada show that strawberries and raspberries are fairly tolerant to 2,4-D but currants appear very susceptible. Other promising herbicides for strawberries were a dinitro oil mixture and IPC. The former has also given good results as a pre-emergence spray for rhubarb.

2967. CURTIS, O. F., JR.

Chemical weed control in nursery tree rows.

Proc. Amer. Soc. hort. Sci., 1952, 60: 109-16, bibl. 3, being *J. Pap. N.Y. St. agric. Exp. Stat.* 890.

A dinitro spray, consisting of 1 qt Dow General (1-3 lb. dinitro-o-sec-butylphenol) plus 10 gal. fuel oil emulsified with water to make 100 gal. and used at 150-250 gal. per acre, produced as good growth of nursery apple trees as did hoeing when compared over a 3-year period. There was no sign of cumulative or residual injury to the trees. A concentrate spray of the same emulsion applied without water at 15 to 25 gal. per acre was nearly as effective. Weed control was good except for certain perennial grasses, notably quack grass, *Agropyron repens*. These grasses were effectively controlled by sprays of No. 2 fuel oil directed to avoid wetting the tree stems. Apple seedlings treated in this way made better growth than seedlings receiving the same number of hoeing treatments.

Weed control on roadsides.

2968. YOUNG, D. W., AND LOOMIS, W. E.

Control of vegetation on roadbeds and similar areas.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 47-50.

In a 2-year study in Iowa, early (April, May) applications of 40 lb. of TCA sodium salt plus 80 lb. of sodium chlorate per acre have given good control of perennial weeds, and periodic treatments with 60 gal. per acre of oil containing 50% aromatics and olefins have controlled reinfestation with annual broad-leaved and grassy weeds.

2969. COCK, R. E.

Spraying roadsides for the control of woody growths.

Tasm. J. Agric., 1953, 24: 34-6.

The use of an off-set boom and gear type pump is recommended. The optimum rate of spraying per mile of single roadside is 20 gal. water containing 8 oz. acid equivalent 2,4-D or 2,4,5-T dependent on species.

Weed control in lawns.

(See also 3357.)

2970. ZUKEL, J. W.

Temporary grass inhibition with maleic hydrazide.

Agric. Chemls., 1953, 8: 45-7, 143, bibl. 3, illus.

Application of MH is suggested only for established turf areas, two or more years old. Since approximately 24 hours are required for complete absorption of an

MH spray, rainfall records within this period will assist in interpreting results. An autumn spray of 4 to 6 lb. MH (10 to 15 lb. MH-40) in not less than 40 gal. water per acre applied to green turf is suggested. Mowing after application is not required. An early spring application at the same concentration and rate in not less than 40 gal. water per acre applied to green grass when about 3 in. tall at the start of growth offers results equivalent to autumn treatment. [From author's summary.]

2971. ENGEL, R. E., ALDRICH, R. J., AND

AHLGREN, G. H.

A comparison of five chemicals for crabgrass control in turf.

Weeds, N. York, 1953, 2: 27-32, bibl. 2.

Sodium arsenite, phenyl mercuric acetate, potassium cyanate, monoamminoboron fluoride (S-1840) and bis (lauryl, di 2-hydroxyethylammino) boron fluoride (S-1998) were tested in New Jersey over 4 years for crabgrass control in turf. All compounds except sodium arsenite resulted in 89% or better control, and turf injury in ascending order was phenyl mercuric acetate, potassium cyanate, S-1998 and S-1840.

2972. ANON.

Chlordane offers new crabgrass control.

65th A.R. Mich. agric. Exp. Stat. 1951/52, 1952, p. 93.

Results from greenhouse trials indicated that chlordane has the property of delaying emergence and preventing germination of crabgrass seeds. It also has some effect upon the germination of other grass seeds. This fact is important because none of the crabgrass control methods now available affects seed germination and repeated applications are therefore necessary. Chickweed, too, can be killed about as readily as crabgrass with chlordane in oil. [See also *H.A.*, 22: 1488.]

Weed control in vegetable crops.

(See also 2999n, p.)

2973. ANDERSEN, E. T., AND OTHERS.

Effect of chemicals on vegetables.

Proc. and Abstr. 5th west. Canad. Weed Control Conf., 1951, Vancouver, 1951, pp. 59-73 [received 1953].

Work reported deals mainly with weed control in peas, onions, carrots and potatoes, but abstracts on results obtained in parsnips, cucumbers, spinach, cabbage and celery are also included.

2974. WARREN, G. F., AND LARSON, J. E.

Herbicidal mixtures for weed control in vegetable crops.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 72-3.

Sodium TCA at 3 lb. per acre and a PCP formulation in an oil carrier at 2 lb. of PCP per acre gave highly effective control of both broad-leaved and grassy weeds when applied about 2 days before tomato-emergence. Stoddard solvent at 75 gal. per acre in which 12 lb. of CIPC had been dissolved was found very satisfactory when applied just before onion-emergence.

2975. FITZGERALD, J. N.

T.C.A. and I.P.C. weedkillers.

N.Z. J. Agric., 1953, 86: 261.

In herbicide tests at Invermay Research Station on soil types sufficiently high in colloidal content to inhibit excessive leaching of TCA, TCA at 5, 10 and 20 lb. and the emulsifiable form of IPC at 1, 2 and 4 lb. per acre were sprayed on peas (1) before emergence, (2) at 0-4 in. stage, and (3) at semi-maturity. The peas were quite tolerant of pre-emergence sprays of TCA and IPC. At the 0-4 in. stage they were little affected by the lower rates but were scorched or burned by the higher rates, especially of IPC. At the semi-mature stage they were unaffected by TCA but were checked by the higher rates of IPC. It is recommended that pre-emergence sprays should be applied. The trials showed that spurrey can be killed by the higher rates of both chemicals. Since brassica crops are relatively resistant to them, TCA and IPC afford a means of eradicating spurrey in brassicas.

2976. SHADBOLT, C. A., AND HOLM, L. G.

The effect of weed competition on the growth and development of carrots.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 69-70.

In experiments conducted by the University of Wisconsin, it was evident that many quantitative factors may suffer as a result of weed competition during the early stages of development of carrots. Yield was seriously reduced at all levels of competition. The suggestion that by delaying harvest yield reduction may be overcome is considered commercially undesirable. Furthermore, it is clearly shown that once diameter, shape or stand are adversely affected, there is little recovery.

2977. ALBAN, E. K.

Pre- and post-emergence weed control in onions.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 77-81.

Of the herbicides tested in Ohio Stoddard solvent, potassium cyanate (KOCN) and sodium isopropyl xanthate (SIPX) were the safest and most satisfactory pre-emergence treatments, giving effective weed control in onions for about 3 weeks. No successful post-emergence control could be obtained without a significant reduction in yield as compared with hand weeding.

2978. CARSTENS, M. W.

Weed control in processing crops.

Proc. and Abstr. 5th west. Canad. Weed Control Conf., 1951, Vancouver, 1951, pp. 159-65 [received 1953].

For processing peas ground application of dinitro selective at 1 gal. in 100 gal. of water per acre or aeroplane application of potassium cyanate at 7 lb. in 10 to 15 gal. water per acre are recommended. With both herbicides best results were obtained when the weeds were in the seedling stage and the weather was warm. In strawberries during the dormant season dinitro general and IPC gave satisfactory weed control.

2979. L'ARRIVEE, J. C. M.

Chemical weed control in peas.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 68-9.

In trials conducted in Manitoba, MCPA applied at $\frac{1}{4}$ lb. per acre post-emergence and at 1 lb. per acre pre-emergence gave very satisfactory weed control without injuring peas.

2980. BUCHHOLTZ, K. P.

Control of weeds in canning peas with MCP.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 75-6.

Of the forms of MCPA tested for weed control in canning peas the sodium salt and amine formulations were found less toxic to the crop than the ester. The range of tolerance being small, it appears that 0.25 lb. per acre is the highest rate of application that can be depended upon not to reduce yields appreciably, though, if Canada thistle is present, 0.50 lb. per acre will be needed for satisfactory weed control.

Weed control in waterways.

2981. OBORN, E. T.

Translocation studies in the submerged tissues of aquatic vascular plants.

From abstr. in *Dissert. Abstr.*, 1952, 12: 771.

Studies on the physiology of some water weeds found in irrigation canals are reported, with special reference to their response to hormone weedkillers. The amounts of 2,4-D and number of treatments required to give complete or nearly complete control of 9 aquatic weeds are tabulated.—Mich. St. Coll.

2982. SENARATNA, J. E.

Salvinia in Ceylon.

Trop. Agriculturist, 1952, 108: 194-5.

The water ferns, *Salvinia auriculata* and *S. natans*, particularly the former, have spread to a serious extent in Ceylon waterways. Trials with hormone weedkillers are in progress, and pending their results hand collection is advocated.

Herbicides and equipment.

(See also 2926, 2999c, g, j, m, u.)

2983. BLACKMAN, G. E.

Herbicides: their use and abuse.

Fert. Feed. St. J., 1953, 39: 173-5, 179-80.

Perhaps all the existing herbicides have certain shortcomings, though many disadvantages such as toxicity to man and animals as in case of DNOC and DNBP can be eliminated by normal precautions taken in the use and storage of the materials. Application of recommended rates will also save disappointment. No harmful long-term effects on soil and soil micro-organisms have been observed to date, but in spite of it rotation of the herbicides employed is considered a sound practice, particularly where the weeds are not capable of being eradicated by a single compound.

2984. OSVALD, H., AND ÅBERG, E.

Kampen mot ogråset. (Weed control.)

[English summary 4 pp.]

Växtodling, 7, 1952, pp. 123-48.

The merits of several herbicides are reviewed and their effect on weeds and cultivated plants, including vegetables and ornamentals, is tabulated. Scientific plant names are given in addition to Swedish common names.

2985. HAMMER, O.

Hormone weed-killers and bees.

Research, 1953, 6: 151-3.

The extensive use of herbicides in Denmark, particularly 2,4-D and 4K-2M [MCPA] and to a lesser extent dinitro compounds, has led to the widespread destruction of bees. Studies at the Danish Bee Research Institute, Hillerod, reviewed here, indicate that mortality increases with both dosage and concentration. The damage is minimized if spraying is done either before or after the blooming period of such weeds as charlock or under cold or dry conditions when the bees do little foraging and the spray dries rapidly. Packages of herbicides now carry labels warning of the danger, and it is hoped to introduce legislation enforcing the payment of compensation for damage to bee stocks.

2986. DOXEY, D.

The use of radioactive iodine in the study of a plant growth-regulator.

J. exp. Bot., 1953, 4: 53-8, bibl. 8, illus.

In order to study the selective action of growth-regulating compounds, 2-iodo-4-chlorophenoxyacetic acid labelled with I^{131} was applied in the form of a 0.25% olive oil solution to the upper surface of the leaves of a susceptible plant (broad bean) and a resistant plant (oat) at the rate of 0.01 ml. solution per plant. The chemical was rapidly absorbed and translocated in the broad bean, reaching all parts of the plant (except the lowest roots and untreated leaves) in 16 hours and appearing everywhere within 27 hours. A high proportion of the material applied was absorbed. In the oat a much smaller amount of the material was absorbed and, after a fairly rapid initial movement down the treated leaf, translocation was much slower than in the bean. Limited activity appeared in the roots in 27 hours only under the most favourable conditions. These results favour the theory that resistance is due to an obstruction to the entry of the growth substance into the plant and to its subsequent translocation.—Jealott's Hill Res. Stat., Bracknell, Berks.

2987. SHAW, W. S., AND SWANSON, C. R.

The relation of structural configuration to the herbicidal properties and phytotoxicity of several carbamates and other chemicals.

Weeds, N. York, 1953, 2: 43-65, bibl. 18.

Results of preliminary greenhouse studies with several carbamate derivatives using 4 crop and 4 weed test plants are given, and indicate a high degree of correlation between molecular configuration and herbicidal activity. Volatility is considered as probably important in determining the length of residual weed control and residual soil toxicity. It is suggested that a chlorophyll inhibition produced may be due to induced chromosome aberration involving genes controlling chlorophyll production. Very considerable selectivity and specificity was established by the various carbamates. Results

obtained in field experiments with 29° carbamates on 30 plant species confirmed those reported for the preliminary trials.

2988. GRANSTRÖM, B., AND OTTOSSON, L.
Dinitrobutylfenol som ogräsbekämpningsmedel. (Dinitrobutyl phenol as a herbicide.)
[English summary 1 p.]

Växtodling, 7, 1952, pp. 40-61, bibl. 38.

For spraying peas with the ammonium salt of dinitro butyl phenol 1 kg. active substance per hectare proved most suitable at 18°-25° C. At higher temperatures the quantity used should be lowered to 0.8 kg. The response of many common weeds to the chemical is discussed in some detail. Mixtures of dinitro butyl phenol and MCPA were found to have a slightly greater herbicidal effect than either of them applied separately without being more injurious to the crop plants.

2989. HAUSER, E. W., AND YOUNG, D. W.
Penetration and translocation of 2,4-D compounds.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 27-31.

The main results of experiments conducted at Iowa Agricultural Experiment Station with soya beans as test plants, are summarized as follows: The isopropyl ester of 2,4-D penetrated rapidly, the sodium salt was absorbed slowly, while the amine was intermediate in rate. The rates of absorption of all the 2,4-D compounds were increased when surface-active agents were added to the spray solutions. The rate of effective penetration was more rapid as the concentration of 2,4-D per unit volume of solution was increased. A reserve carbohydrate supply was not essential for penetration of 2,4-D but was essential for translocation. Translocation of 2,4-D was slowed or stopped when plants were held at low temperatures but occurred when treated plants were returned to normal temperatures. Amines and esters appeared to be translocated equally well in plants. Translocation of 2,4-D was not significantly reduced when plants were under stress for moisture. Toxic materials combined with 2,4-D may reduce translocation of the latter by injuring the translocating tissues.

2990. WORT, D. J.

The effect of 2,4-D on plant enzymes.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 32-4.

The author considers that information available at the present time does not seem sufficient to support the thesis that 2,4-D has very much direct action on enzymes but the indirect effects of 2,4-D are many and of very considerable physiological significance. A full-page table, compiled from data from many workers, shows the effect of 2,4-D on various enzymes and vitamins of different plant species.

2991. GERTSCH, M. E.

The influence of various carriers upon the inhibitory effectiveness of 2,4-D sprays.

Weeds, N. York, 1953, 2: 33-42, bibl. 8.

The inhibition of new growth of Black Valentine bush bean (*Phaseolus vulgaris*) was used to indicate the

effectiveness of 0.05 lb. per acre of 2,4-D applied in various carriers. Least inhibition occurred when water alone was used and most with oil emulsions. The surface-active agent Triton X-155 was consistently more effective than Triton X-45.

2992. WURGLER, W.

Accidents sur la vigne occasionnés par les désherbants à base de 2,4-D. (Injuries to vine caused by 2,4-D herbicides.)

Rev. romande Agric. Vitic., 1953, 9: 32-4, bibl. 8, illus.

A few drops of a 2,4-D spray at herbicidal and lower concentrations were found to cause severe injury to vine. Applications to the soil had the same damaging effect, except on old vines. When the chemical was applied before the end of July the response was immediate; later treatment led to the symptoms appearing the next spring or after two years. Malformation of the foliage was always associated with berry drop. Certain precautions are recommended.

2993. STAPP, C., AND WETTER, C.

Untersuchungen über die Wirkung von 2,4-D im Boden. III. Mitteilung: Eine neue Nachweismethode mit Kresse (*Lepidium sativum*) und Modellversuche über die mikrobielle Zersetzung von Wuchsstofflösungen in Bottichen. (The action of 2,4-D in the soil. III.* A new method of estimating the microbial decomposition of growth substance solutions in vats using cress roots and small scale experiments.)

Phytopath. Z., 1953, 20: 227-38, bibl. 8.

A method is described involving the use of the primary roots of cress seedlings for the quantitative estimation of 2,4-D in the soil. Experiments on microbial decomposition showed that containers can be detoxicated after spraying with 2,4-D by filling them with water and adding 10% (by weight) of soil. If the containers are left standing for a period of up to 3 weeks, preferably at temperatures above 20° C., the herbicide will decompose completely, provided the concentration of the solution does not exceed 0.003%.—Biol. Bundesanst. f. Land- u. Forstwirtschaft, Braunschweig-Giesmarode.

2994. UNIVERSAL CROP PROTECTION LTD.
TCA.

Tech. Commun. Univ. Crop Prot. Ltd. 3, [1953 ?], pp. 21, bibl. 230.

Two pages of this short review are devoted to the chemistry and general use of TCA, the action of which appears to be twofold: a burning, scorching effect on foliage, and a systemic effect through root absorption. The main part consists of very brief notes on crop reactions to this chemical and on its effect on the weeds listed. The information is drawn from very many sources.

2995. TIBBITS, T. W., AND HOLM, L. G.

Physiological studies on the behaviour of TCA in vegetable crops and soils.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 76-7.

* For Parts I and II see *Ibidem*, 1952, 18: 365-75 and 19 20-33.

Organic and silt loam soils treated with TCA for 2 years at 15 and 30 lb. levels produced higher yields of snap beans during the third year than the control plots. A study on the behaviour of TCA in young pea and bean plants revealed that certain organs of both have the same ability to accumulate the chemical. A very marked difference was found, however, in the amount of TCA present in the terminal buds of the two plants. The highest concentration of TCA in any of the organs of the bean was observed in the terminal buds, while no TCA was found in the terminal buds of peas.

2996. SEN, G., AND WOODFORD, E. K.

Effects of trichloroacetic acid on the extension growth of root and shoot segments of *Pisum sativum*.

Nature, 1953, **171**: 936-7, bibl. 4.

In the course of a general investigation of the physiological effects of TCA it was found that the relationship between varying concentrations of the acid and the elongation of pea root segments is of an unusual type. At low concentrations ($10^{-11} M$) there is some inhibition which reaches its maximum at $c. 10^{-9} M$. At higher concentrations there is a reversal in trend such that growth is not affected at $10^{-4} M$, while between $10^{-4} M$ and $3 \times 10^{-3} M$ the rate of elongation is progressively increased. Not until concentrations of $10^{-2} M$ are reached is extension growth again inhibited. The response of intact roots and shoots differed from that described for root segments. In a combined treatment of shoot and root segments with TCA and 2,4-D significant interactions were observed to occur between the two acids. Following a discussion of their mechanism it is suggested that the phytotoxic properties of TCA may be related to the auxin status of the plant and that herbicides consisting of mixtures of TCA and 2,4-D may have definite disadvantages.—Univ. Oxford.

2997. HELLQVIST, H.

Besprutningstekniska problem vid användning av kemiska ogräsmedel. (Problems of spraying technique in the application of herbicides.) [English summary ¼ p.]

Växtodling, 7, 1952, pp. 78-94, bibl. 17, illus.

Morphology and physical characters of the leaf, chemical properties and quantity of liquid applied, droplet size and contact angle were among the factors considered in experiments on the retention of herbicidal sprays by the plant. Peas were found to be more susceptible to low volume applications of Agroxone and dinitro butyl phenol than to standard solutions containing the same quantity of active substance.

2998. VALLANCE, L. G.

Farm built equipment. A guide to building a suitable power spray.

Cane Grs' quart. Bull., 1953, **16**: 99-116, illus.

A detailed account, supported by diagrams and photographs, is given of the design and assembly of a tractor-mounted boom sprayer suitable for weed control spraying in sugar cane, etc. An appendix lists 52 weeds with notes on their reactions to Methoxone and 2,4-D.

Noted.

2999.

a BEATTY, R. H.

Brush control in the future.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 57-9.

b BLACKMAN, G. E., AND ROBERTSON-CUNINGHAME, R. C.

The influence of pH on the phytotoxicity of 2: 4-dichlorophenoxyacetic acid to *Lemna minor*.

New Phytol., 1953, **52**: 71-5, bibl. 10.

c CORL, C. S.

A method for the testing and comparison of brodjet sprayers.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 40-1.

d CORNS, W. G.

Chemical control of persistent perennial weeds in Western Canada.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 15-17.

e COUPLAND, R. T.

Life history studies of weeds.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 35-6, bibl. extensive.

A review with suggestions for wider botanical studies.

f DURR, E.

Brush control on rights of way by basal, stem, and trunk treatment.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 64-5.

g FOSTER, J. R.

Comparison of present methods of application.

Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf., 1952, Winnipeg, pp. 36-8.

Herbicidal spraying and dusting equipment.

h FRIESEN, H. A.

The control of toadflax.

Proc. and Abstr. 5th west. Canad. Weed Control Conf., 1951, Vancouver, 1951, pp. 165-71 [received 1953].

By chemical and mechanical means.

i GORDON, N., AND BEROZA, M.

Spectrophotometric determination of small quantities of 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid, using partition chromatography.

Analyt. Chem., 1952, **24**: 1968-71, bibl. 11.

j GRANSTRÖM, B.
Nya medel i kampen mot ogräset. (New herbicides.) [English summary ½ p.] *Växtodling*, 7, 1952, pp. 109-20, bibl. 53. Results obtained in tests of 7 herbicides.

k HANSON, H. L.
Some observations on population dynamics of secondary woody vegetation. *Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf.*, 1952, Winnipeg, pp. 51-3. Invasion and regeneration of hazel, alder, raspberry and willow.

l HUFFAKER, C. B., AND KENNEDY, C. E.
Ecological tests on *Chrysolina gemellata* (Rossi) and *C. hyperici* Forst. in the biological control of klamath weed. *J. econ. Ent.*, 1952, 45: 1061-4, bibl. 2.

m LARSON, R. E.
Aerial application techniques. *Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf.*, 1952, Winnipeg, pp. 41-2.

n LECOMPTE, S. B., Jr.
Spinach yield increased, weeds reduced by calcium cyanamide. *N.J. Agric.*, 1953, 35 (1): 3, illus. Applied at 600 to 800 lb. per acre.

o LOGAN, A. V., ODELL, N. R., AND FREED, V. H.
The use of C^{14} in a study of the leaching rate of isopropyl N-phenyl carbamate. *Weeds*, N. York, 1953, 2: 24-6, bibl. 7, being *Res. Pap. Ore. St. Coll.* 216.

p NYLUND, R. E.
The control of weeds in onions with pre-emergence sprays. *Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf.*, 1952, Winnipeg, pp. 71-2, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2938. Stoddard solvent, KCNO and CMU.

q OSVALD, H.
"Ogräsforskningen" vid Institutionen för Växtodlingslära 1949-1951. (Research on weed control at the Institute of Plant Husbandry, Uppsala, 1949-51.) [English summary pp. 1½.] *Växtodling*, 7, 1952, pp. 7-10.

r PLAYFAIR, L.
Dormant spraying of woody growth. *Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf.*, 1952, Winnipeg, pp. 63-4.

s RASMUSSEN, L. W., AND WOLFE, H. H.
Weed killers are plant killers! *Ext. Circ. Wash. St. agric. Ext. Serv.* 221, 1953, pp. 3.

t RIEPMA, P.
Grensvlakverschijnselen en selectiviteit bij de chemische onkruidbestrijding. (Surface phenomena and selectivity in chemical weed control.) *Landbouwk. Tijdschr.*, 1952, 64: 387-93, bibl. 28. A review of the literature.

u SHANKS, G. L.
General development of the boomless sprayer. *Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf.*, 1952, Winnipeg, pp. 38-40.

v SMITH, H. L.
Railway application equipment for weed, grass and brush control by use of chemicals. *Proc. Joint Mtg 9th annu. N. centr. Weed Control Conf. and 6th annu. west. Canad. Weed Control Conf.*, 1952, Winnipeg, pp. 43-4.

w VLITOS, A. J.
Biological activation of sodium 2-(2,4-dichlorophenoxy) ethyl sulfate. *Contr. Boyce Thompson Inst.*, 1953, 17: 127-49, bibl. 25. Crag Herbicide I.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(See also 2408, 2409, 2411, 2413, 2414, 2444-2447, 2478, 2480, 2481, 2488-2495, 2498, 2499, 2502, 2503, 2508, 2510, 2512, 2513, 2516e, 2621, 2655, 2794, 2804, 2922, 2923, 2925, 2928, 3312, 3393, 3511, 3627u, 3628, 3637, 3641, 3644.)

3000. HILL, K. W., AND PALMER, A. E.
Irrigation farming in southern Alberta. *Publ. Dep. Agric.*, Ottawa, 883, 1953, pp. 63, illus.

The purpose of this bulletin is to review the common agricultural practices in this irrigated area and to present information and recommendations which may assist in the stabilization of agriculture in this and similar districts. The crops grown are mainly agricultural, but peas, beans and pumpkins, all for canning,

form parts of the rotation system and certain speciality crops have been grown successfully. Apart from crop production practices, subjects dealt with include climate and soils, methods of irrigation, crop rotations, fertilizers, control of soil drifting, weed control and planning.

3001. FRANKLIN, E. W., JONES, T. H., AND GRAHAM, T. O.
Progress report on certain phases of vegetable varietal work. [Publ.] *Ont. agric. Coll. Guelph.*, 1952, pp. 6, illus.

This report is divided into 3 parts: I. Canning and freezing trials of sweet corn, lima beans and snap beans. II. Trials of leafmould-resistant greenhouse tomatoes. III. Trials of pickling gherkins.

3002. BLANKHOLM, E., AND KLOUGART, A.
33. Beretning fra Fællesudvalget for Prøvedyrkning af Køkkenurter. (33rd Report of the Committee for Vegetable Trials.)
Årbog Gartneri, 1952, 1953, pp. 175-230.
Following a brief survey of past and future programmes, reports 127-131 are submitted with detailed accounts of variety trials with parsley, spring glasshouse lettuce, summer red cabbage, early and summer spinach.

3003. LARSSON, G.
Sortförsök med köksväxter i Norrland. VII. Sockerärter, rödbetor och vitkål, 1949-1951. (Variety trials with vegetables in Norrland. VII. Sugar pea, garden beet and cabbage, 1949-51.) [English summary 2 1/2 pp.] *Medd. Trädgårdsförs. Malmö* 76, 1953, pp. 66, bibl. 18, illus.
Variety trials with sugar pea, garden beet and white cabbage were carried out between 1949 and 1951 in Norrland. *Sugar pea*. Of tall and medium, the best round-podded variety was Pollux and the best flat-podded varieties were Signal, Norrlands Express and Midsommar Triumf. The best dwarf varieties were Reform and Symbol. *Garden beet*. Egyptian turnip-rooted is recommended for southern and central Norrland and Crosby for the whole of Sweden. *White Cabbage*. Varieties recommended for all parts of Sweden are Ruhm von Enkhuizen and Ditmarsker; the latter was the only one of the four varieties tested that gave fairly good yields even in the northern and most extreme regions of Norrland.

3004. SHEWELT, A. L., AND BROWN, D. R.
Chemical variation in varieties.
A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Ctte 1951, pp. 3.
Data are tabulated on (1) the total acid values of 6 varieties of rhubarb in 3 different years, (2) the moisture, total acid, soluble solids and ascorbic acid contents of 2 varieties of raspberry in 2 different years, (3) the ascorbic acid contents of 4 varieties of pea in 3 different years, and (4) the ascorbic acid content of 5 varieties of snap bean in 3 different years.—Dom. exp. Stat., Morden, Man.

3005. MCGILLIVRAY, J. H., PERDUE, J. W., AND YAMAGUCHI, M.
Food value of some minor California vegetable crops.
Truck Crops Mimeo. Univ. Calif. Davis, 53, 1952, pp. 11, bibl. 7.
Twelve minor vegetables [e.g. chicory, New Zealand spinach, etc.] are briefly described and their composition is given.

3006. HÄNSEL, H.
Vernalisation (Jarovisation, Kältetestung). Forschungsergebnisse und ihre Verwertung in Pflanzenbau, Samenbau und Pflanzenzüchtung (Übersicht). (Vernalization. Experimental results and their application in agriculture, seed production and plant breeding. (A review.))
Ber. Arbeitstag 1952 Arbeitsgemeinsch. Saatzuchtleiter, Admont, 1952, pp. 66-120, bibl. 3 pp.

Part I (25 pp.) deals with general problems. The special crops dealt with in Part II include garden beet, kohlrabi and onion.

3007. GROOTERS, G. F., AND SNEEP, J.
De productie van groentezaden in de Verenigde Staten. (Vegetable seed production in the U.S.A.) [English summary 3 pp.] [Publ.] *Contactgroep Opvoering Productiviteit*, 's-Gravenhage, [undated, received 1953], pp. 124, illus.
In this report of a study visit to the various vegetable breeding and seed producing centres of the U.S.A., a detailed survey is given of the organization and methods of the industry, special attention being paid to methods that could be made use of in Holland. Subjects dealt with include aims and methods of breeding, areas of seed production and their climate, organization of seed production, mechanization, variety testing, quality control, and the seed trade.

3008. INDEN, T.
On the physiology of roots in vegetable crops.
1. On the oxygen requirement of the roots in vegetable crops. [Japanese, with English summary 1/2 p.]
J. hort. Ass. Japan, 1953, 21: 202-7, bibl. 46.
Twenty plants were studied. These included kidney bean, strawberry, eggplant, broad bean, pea, Chinese cabbage, spinach, lettuce, radish, spinach beet, *Cryptotaenia japonica*, tomato, pepper and cucumber.

3009. HOOGHOUTD, S. B.
Resultaten van het grondwaterstandsproefveld te Nieuw-Beerta. (Results of experiments on water table level at Nieuw-Beerta.) [English and French summaries 1/2 p. each.] *Versl. Techn. Bijeenk, Commiss. hydr. Onderz., T.N.O.* 1-6, 1952, pp. 56-64 [summaries pp. 285, 313], bibl. 1, illus.
These experiments on the effect of water table level were carried out mainly on agricultural crops, but peas and caraway were included. High water tables (40 or 60 cm. below the surface) kept stable throughout the year resulted in a serious depression in yield with most crops, particularly cereals and peas. Yields were not much affected by high water tables during winter (November to February) only. Depression in yields due to a high water table may be reduced by extra applications of nitrogen.

3010. ZLATKOVSKÝ, A.
Předpěstování sadby různými způsoby a vhodnost těchto při rychlení zeleniny. (Suitable methods of growing early vegetables.) [English and Russian summaries 1/2 p. each.]
Sborn. čsl. Akad. Zeměd., 1952, 25: 355-62, bibl. 11, illus.
Trials conducted at Pruhonice in 1951 with cauliflower, kohlrabi, lettuce and celeriac have shown that transplanting has an unfavourable effect on earliness and in some cases on yield. The best results were obtained by sowing *in situ*, in frames filled with soil containing 25-35% alkaline peat, either in rows or in groups. Mulching with a mixture of peat and saturated lime

(sugar factory refuse) increased both earliness and yield of produce.

3011. FORSEE, W. T., Jr.

Minor element deficiencies and field corrections established by research in Florida vegetables.

Proc. Fla St. hort. Soc. for 1952, pp. 154-9, bibl. 40, illus., being *J. Ser. Fla agric. Exp. Stat.* 130.

Work is reviewed on the occurrence and treatment of deficiencies of the minor elements copper, manganese, zinc, boron, iron and molybdenum in vegetable crops in Florida.

3012. LINSER, H., AND PELIKAN, W.

Über die Verfügbarkeit des Bors im Borkalkammonsalpeter für Pflanzen. (The availability of boron in boron-calcium-ammonium nitrate.)

Bodenkultur, 1952, 6: 219-24, bibl. 4.

During various long periods of growth (in turf-sand cultures) cucumber and tomato plants were supplied with boric acid or with boron-calcium-ammonium nitrate. The plants took up more B, the longer the nutrients were applied. The relative B content of the dry matter was markedly higher when the nutrients were applied over a long than over a short period. In the absorption of B no difference was found between the intake from boric acid and that from boron-calcium-ammonium nitrate. [See also *H.A.*, 22: 2569.]

3013. HINSVARK, O. N., WITWER, S. H., AND

TUKEY, H. B.

The metabolism of foliar-applied urea. I. Relative rates of $C^{14}O_2$ production by certain vegetable plants treated with labeled urea.

Plant Physiol., 1953, 28: 70-6, bibl. 5, illus., being *J. Art. Mich. agric. Exp. Stat.* 1380.

The first step in the utilization of the nitrogen in urea applied to the leaves of plants presumably is hydrolysis by the enzyme urease giving NH_3 and CO_2 . The comparative rate constants of the activity-time curves of the enzymatic hydrolysis of carbon-14-labelled urea applied to the leaves of cucumber, bean, tomato, corn, celery, and potato were determined by continuously monitoring the air and recording the accumulation of $C^{14}O_2$ in a closed system. The initial reaction rates for cucumber, bean, tomato, and corn, the leaves of which were found relatively intolerant to urea, were typically of zero order. With celery and potato plants having considerably more tolerance to foliar-applied urea, the kinetics of the enzymatic hydrolysis of urea by the leaves were of first order. Equal molar concentrations of sucrose used in solution with urea and applied to the foliage of tomato plants significantly reduced the rate of urea hydrolysis. It is suggested that plants most easily injured by urea sprays are apparently those which have the highest urease activity, and the initial kinetics of the reaction are of zero order. Conductiveness towards urea injury is indicative of rapid hydrolysis and may denote rapid utilization. Hydrolysis as it occurs in the leaves of plants subsequent to foliar applications of urea appears to be equivalent to utilization. [Authors' summary.]

3014. MCCALL, W. W., AND DAVIS, J. F.

Foliar applications of plant nutrients to crops grown on organic soils.

Quart. Bull. Mich. agric. Exp. Stat., 1953, 35: 373-83, bibl. 11.

Foliar applications of N, P, K, Mg, Mn, B and Zn on onions, red beet, sugar beet, potatoes and celery were compared with normal soil applications. In general higher crop yields were obtained from soil- than from foliar-applications of N. P sprays did not increase onion and celery yields, and Zn sprays gave reduced yields of onions and potatoes. It is concluded that foliar application of plant nutrients should be considered as supplemental to the regular fertilizer programme.

3015. WESTGATE, P. J.

Preliminary report on copper toxicity and iron chlorosis in old vegetable fields.

Proc. Fla St. hort. Soc. for 1952, pp. 143-6, bibl. 13, illus., being *J. Ser. Fla agric. Exp. Stat.* 110.

Preliminary indications are that copper residues from years of copper sprays on celery and other crops have accumulated in toxic amounts in the surface layer of old celery fields in the Sanford area. Brown, stubby roots, iron chlorosis of the leaves, and a general stunting of the plant are symptoms of copper toxicity. Celery is more tolerant of high concentrations of copper in the soil than corn. Beans, squash, cabbage, cauliflower, beets and gladioli are among the crops adversely affected by excessive amounts of copper in the soil. Liming of acid soils containing copper residues reduced iron chlorosis and other copper toxicity symptoms by lowering the solubility of copper, whereas acidifying the soil increased copper toxicity by increasing its solubility. Iron sulphate as a leaf spray serves as a temporary means of correcting iron chlorosis, but soil applications are ineffective when total copper in the soil is high. Chelated iron, either as a leaf spray or as a soil amendment, will correct iron chlorosis in various vegetable and ornamental crops even in the presence of high copper, although it may not overcome the injured root system and stunting. [Author's summary.]

3016. KORITZ, H. G., AND WENT, F. W.

The physiological action of smog on plants.

I. Initial growth and transpiration studies.

Plant Physiol., 1953, 28: 50-62, bibl. 9.

The effect of synthetic smog (1-n-hexene plus ozone) on growth and transpiration of tomato plants and on elongation of etiolated pea sections has been studied. Use has been made of hidden damage (growth decrease in the absence of visible injury) to measure the effect of light, sucrose spray, β -naphthoxyacetic acid, and water supply on smog injury. Growth of tomato plants fumigated in the dark or light just following a 12-hour dark period or in the dark after 1½ hours of light was unaffected by smog. Growth of plants fumigated in the light at mid-day or early afternoon was significantly decreased by smog treatment. Sucrose spray partially protected tomato plants against smog damage. β -naphthoxyacetic acid did not significantly affect the response of tomato plants to smog. Smog treatment did not affect the elongation of etiolated pea sections either in water or in 2,4-D solution. Tomato plants given limited water supply were resistant to smog damage while comparable plants receiving ample water were

susceptible. Transpiration and water uptake rates of tomato plants were decreased by subjection to smog. The decrease was followed by recovery to slightly less than control rates. Subsequent fumigation caused repeated drops in transpiration rates followed by partial recovery. No direct correlation between stomatal opening and response of plants to smog was observed. [Authors' summary.]—Calif. Inst. Technol., Pasadena.

3017. LINNASALMI, A.

Damping-off on herbaceous vegetables and ornamental plants grown under glass in Finland. [Finnish summary 9 pp.]

Ann. Bot. Soc. "Vanamo", 1952, 26: 1-121, bibl. pp. 8, illus.

A survey of the damping-off diseases, their distribution and factors affecting them in different parts of the world, and in Finland in particular, is followed by a report of studies on pathogenicity and control. In Finland the most common fungus causing damping-off is *Rhizoctonia solani*, followed by *Pythium debaryanum*. *P. ultimum* is rare. Other damping-off fungi found were *Alternaria brassicicola*, *Stemphylium consortiale*, *Botrytis cinerea* and *Fusarium* spp. The most commonly affected plants were the crucifers. Soil reaction had no effect on the occurrence of the disease. In seed disinfection experiments none of the 14 preparations tested controlled *Rhizoctonia* damping-off, although many were effective against *Pythium*. In soil disinfection experiments steaming for 1 hr at 120° C. or baking at 100° C. completely or almost killed both *Rhizoctonia* and *Pythium*. Control of the two fungi with no injury to the host was also obtained by soil treatment with Arasan, Semesan, and chloropicrin mixed with absolute ethanol and formalin. Results are also given of soil treatment with many other compounds.—Agric. Res. Centre, Tikkurila, Finland.

3018. KOCH, L. W.

Fungicides fight root rots.

Agric. Inst. Rev., 8 (2): 31-2, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa*, 1235.

Among chemical dusts tested for the control of root rots, formulations containing 50% tetramethyl thiuram disulphide (thiram) as the active agent consistently gave the best results. Thiram mixed with the seedbed soil gave highly satisfactory control of damping-off with pepper, Spanish onion, eggplant, spinach and tomato seedlings, but injured celery and lettuce seedlings. It was also found effective against onion smut, *Urocystis cepulae*. In some areas cyanamide plus urea is used for the control of weeds and fungus diseases in outdoor tobacco seedbeds. Other materials showing promise against root rots are certain soil fumigants, originally developed as nematocides, insecticides and herbicides, such as chloropicrin, methyl bromide and ethylene dibromide mixtures.

3019. JOHNSTON, A.

The control by spraying of some diseases of highland vegetables.

Malay. agric. J., 1953, 36: 28-35, illus.

Experiments on the control of carrot leaf blight (*Alternaria dauci*), celery leaf spot (*Septoria apii-graveolentis*), and French bean anthracnose (*Colletotrichum lindemuthianum*) in the Cameron Highlands area are

described. The application of 0.5% perenox (or an equivalent concentration of some other Cu fungicide) at weekly intervals is recommended.

3020. MINISTRY OF AGRICULTURE, LONDON.

Pests and diseases in the vegetable garden. *Growmore Bull. Minist. Agric. Lond.* 2, revised 1952, pp. 20, illus., 1s.

This publication for the gardener deals with general control methods, insecticides, fungicides, the use of sprays and dusts, pests and diseases affecting many crops, and the pests and diseases peculiar to broad beans, dwarf and runner beans, beets, brassicas, carrots and parsnips, celery, lettuces, onions and leeks, peas, potatoes, and tomatoes.

3021. LANGE, W. H., CARLSON, E. C., AND LEACH, L. D.

Pest control by seed treatment.

Calif. Agric., 1953, 7 (5): 7-8.

Methods are described of treating vegetable and other seed with lindane for wireworm and seed-corn maggot control. Generally it is best to apply an insecticide-fungicide mixture and to treat the seed by the liquid fixation, spray, or slurry methods in preference to the dust method. The dosages recommended for different crops are tabulated.—Univ. Calif., Davis.

3022. MANSON, G. F.

Insecticides and vegetable crops.

Agric. Inst. Rev., 1953, 8 (2): 8-9, illus., being *Contr. Div. Ent., Sci. Serv., Dep. Agric., Ottawa*, 3046.

A brief review of insecticidal treatments classified according to the plant parts to which they are applied for protection.

3023. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

Leaf-eating ladybird (*Epilachna 28-punctata*).

Agric. Gaz. N.S.W., 1952, 63: 661.

Notes are given on the leaf-eating ladybird, *Epilachna 28-punctata*, a pest of cucurbits, potatoes and tomatoes. Control of both larvae and adults can be obtained, (1) on the 2 latter crops with 2% DDT dust, or 4 fl. oz. DDT emulsion (or 1½ oz. DDT dispersible powder) to 5 gal. water; and (2) on cucurbits by 0.01% DDT spray, or 0.5% DDT dust, or by 1 part derris to 8 kaolin or talc by weight, but repeated applications of the last are required during early growth.

3024. FJELDDALEN, J.

Røykemidler mot skadedyr i veksthus. (Insecticidal smokes against insect pests in greenhouses.) [English summary.]

Meld. Plantev. 6, 1951, pp. 20, bibl. 1, illus., from abstr. in *Rev. appl. Ent., Ser. A*, 1953, 44: 6.

In this bulletin, the author explains the principles governing the use in greenhouses of insecticidal smokes released by combustion from metal containers or tablets, and records the results of tests with some of them during the winter in Norway. The plants treated were very various, but the only ones injured by the smokes were young tomatoes and *Pelargonium* treated with a mixture of parathion and methyl-parathion, and a few ornamental species treated with azobenzene.

3025. DAVID, W. A. L., AND GARDINER, B. O. C.
Systemic insecticidal action of nicotine and certain other organic bases.

Ann. appl. Biol., 1953, 40: 91-105, bibl. 10.

Nicotine and nicotine salts are taken up by the roots of plants from solutions, and when 0.01-0.001% nicotine is used the plants become toxic to *Aphis fabae* and to *Pieris brassicae* larvae and can be shown to contain nicotine. The results with *Phaedon cochleariae* adults and larvae are less satisfactory. No systemic action is observed when the nicotine is watered on to soil in which plants are growing and no nicotine can be detected in the plants. Apparently the nicotine is decomposed in the soil. When applied several times to the upper surface of a bean leaf nicotine kills aphids on the underside. There is some evidence that nicotine can be translocated further through the plant following leaf applications, but the toxic action at any distance is very weak in the plants used in the present experiments and can only be produced by frequent applications of rather concentrated nicotine solutions. Leaf absorption and subsequent translocation has not been observed with nicotine salts. The various organic bases, including some piperidine phosphonites and allied compounds tested, are of very little interest as contact or systemic insecticides against aphids. [Authors' summary.]—Agric. Res. Coun. Unit of Insect Physiology, Cambridge.

3026. MARINI, E.

Osservazioni sperimentali sulle modalità di lotta contro i nematodi del terreno. (Tests on the control of soil nematodes.)

Not. Mal. Pianta, 1952, No. 21, pp. 11-14, illus.

DD, nematox (DD base) and EDB (1,2-dibromoethane—ethylene dibromide) were tested for the control of *Heterodera marioni* in cold frames by soil fumigation. In liquid application the fumigants were injected at constant intervals varying from 20 to 30 cm. and at a depth of 10 cm., diluted with naphtha at the rate of 100, 50 and nil %. In dust treatment a 10 cm. layer of soil was removed and replaced after even spreading of the dust. DD and EDB gave the best result, namely 80-90% healthy plants. The technique and timing of the treatment, and the apparatus, are discussed.—Ist. Pat. veg. Milano.

3027. CICCARONE, A., AND RUGGIERI, G.

Relazione su prove preliminari di pieno campo per la lotta contro i parassiti del terreno. (Preliminary report on soil sterilization trials.) [English summary ½ p.]

Boll. Staz. Pat. veg. Roma, 1951 (issued 1953), 9: 41-56, bibl. 25, illus.

The preliminary results are given of replicated soil sterilization trials conducted in Sicily in 1950 with 4 fumigants (carbon disulphide, chloropicrin, DD and ethylene dibromide), a 15% BHC product (geogamma) and a 25% parathion product (thiophos). The products were tested in a field sown to French beans. The carbon disulphide was inserted at 40 cm. depth at the rate of 25 quintals per ha. The other 3 fumigants were injected at 17 cm. depth at intervals of 15-25 cm., and at rates equivalent to 9, 15 and 15 hl. per ha. respectively. The BHC and parathion products were incorporated dry with the soil at 1 and 0.75 quintals per ha. respectively.

The best results were given by ethylene dibromide, DD, chloropicrin and carbon disulphide. Under the conditions of the experiment (high soil temperature and sandy soil) crop growth was somewhat retarded by DD and chloropicrin, and carbon disulphide had some phytotoxic effect on the beans. The results with ethylene dibromide, DD and the untreated control were: percentage of plants free from *Heterodera* 97, 100, nil; dry weight per plant 22, 10, 5.5 g.; weight of dry beans 8.5, 3.2, 1.5 g.; herbicidal effect on *Cyperus rotundus*—nutgrass absent, absent, abundant.

3028. BEAN, G.

The development of a universal vegetable washing machine of medium output. I. Horizontal circular conveyor type.

[*Publ. nat. Inst. agric. Engng C.S.* 18, 1952, pp. 16, illus., 4s.]

Current mechanical and manual practices in washing vegetables are examined and the desirable features of a machine suitable for a smallholding are considered. A description is given of the design and performance of such a machine, provided with a hydraulic drive and automatic unloading mechanism, developed by the N.I.A.E.

Asparagus.

3029. ANON.

How Formby grows asparagus.

Grower, 1953, 39: 633.

An account is given of the very specialized methods used for growing asparagus on the sand dunes and level stretches of sand in the Formby district of Lancashire. Reclaimed land is usually abandoned after 15 years when natural weeds tend to predominate. Seedbeds and 1-year-old crowns are protected from being blown away or buried by rows of maram grass spaded into the sand or by a mulch of pine needles. All fields have to be wired against rabbits.

3030. CAROLUS, R. L., LIPTON, W. J., AND APPLE, S. B.

Effect of packaging on quality and market acceptability of asparagus.

Quart. Bull. Mich. agric. Exp. Stat., 1953, 35: 330-42, bibl. 8, illus.

Notes are given showing that packing asparagus in film bags helped to maintain market quality by preventing desiccation, edible quality by reducing the development of fibre, and nutritional quality by preserving the ascorbic acid content. Methods of harvesting and handling are suggested and suitable types of film are discussed. (

Brassicas.

(See also 2479, 3149, 3196f, y, 3197c.)

3031. NORTH, C.

Three methods for vegetative propagation of *Brassica oleracea*.

J. roy. hort. Soc., 1953, 78: 106-11, bibl. 7, illus.

The three methods of propagating brassicas by leaf-bud cuttings, root cuttings and curd portions have been described earlier [see *H.A.*, 22: 2548]. The present account gives additional information on certain points

and in particular on the beneficial effects to the growth of adventitious shoots of applying a nutrient solution of stated composition to root cuttings, beginning 3 weeks after planting. If nutrient solution is supplied, in place of tap water, earlier than this it encourages rotting.

3032. FINCH, C. G.

Variety trials of brussels sprouts 1946/47 to 1951/52.

J. nat. Inst. agric. Bot., 1952, 6: 161-79.

The trials were conducted at or near important brussels sprouts districts (1) to compare the Cambridge varieties with popular commercial varieties and (2) to discover variations due to districts. The varieties under test were Cambridge 1, 3, 5 and Special, Universal, Rous Lench, Wearmouth, Forex, Masterman, Standard, Apex and Premier. There was considerable variation in the behaviour of the varieties from centre to centre and year to year. Detailed results are given for early to midseason, midseason, late season, and top grade sprouts.

3033. SNEEP, J.

Practijkproeven met Westlandse boerenkool, 1949-50 en 1950-51. (Commercial trials with Westland kale, 1949-50 and 1950-51.)

Meded. Inst. Vered. Tuinbouwgew. 42, 1952, pp. 26, illus.

Only the Westland type of curly kale is suitable for commercial culture in Holland. As a result of trials with 24 selections of this type, 2 groups are distinguished—the autumn and winter Westland kales. Five autumn and 2 winter selections are recommended.

3034. NORTH, C., AND SQUIBBES, F. L.

The frequency of occurrence of "off type" plants in seed stocks of some *Brassica oleracea* varieties. An estimation based on the inspection of market crops in the field.

J. nat. Inst. agric. Bot., 1952, 6: 180-90, bibl. 1, illus.

Investigations were conducted in the neighbourhood of Cambridge to assess the general quality of seed stocks of some 9 representative varieties of *Brassica oleracea* and, if possible, to indicate the main causes of poor stock. Three off-types were recognized: hybrids (distinct hybrids between different types or varieties of *B. oleracea*), admixtures (plants of an easily recognizable variety of *B. oleracea* other than those being inspected), and variants (plants that were not true to type but were neither hybrids nor admixtures). *Hybrids* were recognized in a fair proportion of the crops of brussels sprout Cambridge 1 (3.3%), cabbage January King (2%) and broccoli St. George (11%) but do not generally cause the market grower serious loss of yield. *Admixtures* of seed sometimes occur but do not generally cause serious loss. *Variants* often caused surprisingly high losses in market value. In brussels sprout Cambridge 1 they were 12% in certified seed and 80% in uncertified seed; in other varieties they ranged from 14-18% in cabbage Primo and 17% in spring cabbage varieties to 29-33% in cabbage January King and 23-40% in broccoli Roscoff 2. Variants may have been partly due to virus disease, sowing dates and cultural conditions but they were generally scattered at random. This suggests that plants often behave as variants owing to some inherent quality of the seed.

3035. ANON.

A new summer cabbage from Canada.
Grower, 1953, 39: 783.

A description is given of Canadian Acre, a small summer cabbage developed by the Experimental Farm, Ottawa. In England it has given good results and matured 2 weeks earlier than Primo.

3036. ZLATKOVSKÝ, A.

Kříženec květáků a růžičkové kapusty—nový druh zeleniny ve stavu zrodu. (Předběžné sdělení.) (A hybrid between cauliflower and brussels sprouts—a new form vegetable in the making. (Preliminary communication.)) [Russian summary 6 lines.]
Sborn. čsl. Akad. Zeměd., 1952, 25: 387-91, illus.

A cross between the cauliflower variety Hague Erfurt Early Dwarf and the brussels sprouts variety Hercules has produced a new form of vegetable with heads of good flavour and longer axes than the cauliflower.

3037. NAGBISWAS, S. C.

Cabbage seeds from stumps.

Sci. and Cult., 1953, 18: 433-4.

In a comparison of several methods of producing cabbage seed in India the following yielded the highest number of plants that formed seeds, the highest total weight of good seeds and the highest average weight of seeds per plant. The heads were harvested in the usual manner and the stumps, after transplanting to special seed plots, were allowed to run to seed. The trials were carried out with English seed in the neighbourhood of Darjeeling at an altitude of 6,500 ft. For several years plants raised from these seeds have been grown in the plains with encouraging results, regular irrigation being the only requirement.

3038. FINCH, C. G.

The effect of sowing date on the incidence of faulty heads in January King cabbage: Cambridge 1949/50 and 1950/51.

J. nat. Inst. agric. Bot., 1952, 6: 191-5, illus.

The sowing date did not affect the proportion of rosette heads but it had a profound effect on that of loose heads. April sowings produced less than 10% of loose heads, May sowings 27%, and June sowings 30% in 1949/50 (3 June) and 69% in 1950/51 (22 June). A compromise is proposed between sowing sufficiently early to ensure a reasonable yield of true heads and sufficiently late to ensure maturity at the required time.

3039. IWAMA, S., HAMASHIMA, N., AND SERIZAWA, M.

Ecological studies on vegetables in regions of different altitude. I. Ecological behaviour of cabbages (*Brassica oleracea* L. var. *capitata* L.) in summer. [Japanese, with English summary 1/2 p.]

J. hort. Ass. Japan, 1953, 21: 241-50, bibl. 10.

Cabbage varieties and strains were tested in the summers of 1948, 1949 and 1950 at 360, 760 and 1,390 m. above sea level in Nagano Prefecture. The optimum mean daily range of temperature proved to be 15-20°C. Where summer temperature exceeded this,

growth was retarded; it was severely checked when the mean daily figure exceeded 25° C. Above 1,000 m., where mean daily temperature never exceeded 20° C., growth was vigorous. Differences in maturation dates and head weights between early and late varieties were small under cool conditions but large when summer temperatures exceeded the optimum.

3040. SHISA, M., AND HAZU, G.

Snow resistance in *Brassica*. I. Differences of the physiological characters related to snow resistance in the varieties. [Japanese.] *J. hort. Ass. Japan*, 1951, 20: 98-104, bibl. 41.

As the brassicas show great varietal differences in their tolerance of deep snow several physiological functions of different varieties were compared and the varieties grouped accordingly as resistant, medium resistant and susceptible to snow damage. Tests with 21 varieties showed that with 2 exceptions varieties which are highly resistant to chlorate toxicity ($KClO_3$) are susceptible to snow damage, whereas those which can stand snow show low resistance to chlorate toxicity. These snow tolerant varieties show a high dry weight of unit leaf area, a higher percentage of dry matter and reducing sugar in the whole plant and a higher photosynthetic leaf activity at the beginning of the snow season. Respiration in the season of snow-break [sic] is generally higher in varieties susceptible to, than in varieties which can stand, snow. These results suggest that accumulation of carbohydrates in plant tissues at the beginning of the snow season and intensity of carbohydrate consumption by respiration under snow are important factors in determining tolerance to deep snow cover.

Y.A.

3041. FUNAMOTO, H., AND MASUDA, S.

Studies on fractional application of nitrogenous fertilizer in vegetable crops. I. [Japanese.]

J. hort. Ass. Japan, 1952, 21: 123-8, bibl. 14.

Fertilizer trials were made with the Improved Sakata cabbage and the Miyashige Japanese radish. Applications (totals of 265.6 g. for cabbage and 141.0 g. for radish sulphate of ammonia per 3/40 acre plot) were as follows: (1) all at once, (2) half before planting and half 50 days after planting, (3) 1/5 before planting and 1/5 at intervals of 20 days and (4) 1/10 before planting and 1/10 at intervals of 10 days. While early observations appeared to favour other applications, final weights harvested indicate that the nitrogen requirements of both radish and cabbage are best met by the application of fertilizer in 5 doses.

Y.A.

3042. EDDINS, A. H., AND OTHERS.

Correction of molybdenum deficiency in cauliflower.

Proc. Fla St. hort. Soc. for 1952, pp. 114-18, bibl. 10, illus., being *J. Ser. Fla agric. Exp. Stat.* 95.

In field tests made at Hastings, Florida, whiptail in cauliflowers was controlled by treating the soil and plants with sodium or ammonium molybdate. Liming to bring the soil pH to 5.5 was not sufficient to give complete control of whiptail in the first year. Cauliflowers of the Snowball X type were more resistant to molybdenum deficiency than those of the Snowball A type.

3043. MARTH, P. C.

Effect of growth regulators on the retention of color in green sprouting broccoli.

Proc. Amer. Soc. hort. Sci., 1952, 60: 367-9, bibl. 4.

Spraying broccoli a few days before harvest with, or dipping the heads immediately after harvest in, an aqueous solution containing 1,000 p.p.m. 2,4,5-T markedly retarded the loss of green colour by the sepals of heads held in storage. Lower concentrations of 2,4,5-T had little effect on the retention of colour, but as little as 50 p.p.m. had a pronounced effect on preventing the shedding of florets. The treatment was ineffective when applied several days after harvest.—*Plant Ind. Stat.*, Beltsville.

3044. FRY, P. R.

Cauliflower mosaic: a virus disease of brassicas.

N.Z. J. Agric., 1952, 85: 507-8, bibl. 3, illus.

In trials of New Zealand-grown cauliflower, swede, turnip and rape, all the varieties tested were equally susceptible to cauliflower mosaic.

3045. SCHIMMER, F. C.

Alternaria brassicicola on summer cauliflower seed.

Plant Path., 1953, 2: 16-17, bibl. 5.

The cultivation of seed crops of summer cauliflower under glass has been investigated at Wye College since 1950. Each year the inflorescences and pods were severely attacked by *Alternaria brassicicola* and the seed also became infected. Seed disinfection by hot water treatment at 122° F. for 18 minutes was very effective, the percentage seed infection in 1950, 1951 and 1952 being 1, nil and nil compared with 96, 31 and 60 in the untreated controls.

3046. ROBERTSON, A. G., AND OGILVIE, L.

Root rot in brassicas caused by *Phytophthora megasperma*.

Plant Path., 1953, 2: 15.

A root rot of savoy, winter cauliflower and kale observed in 1949 and 1950 was caused by *Phytophthora megasperma* which has been reported as causing a similar disease of cauliflower in North America.—*N.A.A.S.*, Bristol.

3047. NEPVEU, P.

Sur la biologie du charançon des choux-fleurs (*Rhytidoderes plicatus* Ol.) et sur sa destruction dans les cultures du confluent Rhône-Durance. (On the biology of the cauliflower weevil (*Rhytidoderes plicatus* Ol.), and its control near the junction of the Rhone and Durance.)

C.R. Acad. Agric. Fr., 1953, 39: 147-51, bibl. 7.

Preliminary experiments in the control of *Rhytidoderes plicatus* on cauliflowers by the application of insecticidal dusts mixed with the fertilizer showed that aldrin (hexachlorohexyhydrodimethanonaphthalene) is more suitable for this purpose than lindane or γ -BHC. In a further experiment with aldrin, 1-2% dust was applied at rates of 1, 2 and 3 kg./ha. mixed with a complete fertilizer. After harvesting at the end of October the

average numbers of grubs per plant were found to be: control 51, 1 kg. aldrin per ha. 13, 2 kg. 18, and 3 kg. 2.7.—Stat. rég. Zool. agric. (INRA), Villeneuve-les-Avignon (Gard).

3048. MILES, M.

The effect of summer weather on cabbage root flies.

Agriculture, Lond., 1953, 60: 87-91, bibl. 1.

Observations over a number of years suggest that the greatest single factor affecting the numbers and activity of the cabbage root fly (*Erioscicha brassicae*) is the weather. Although the summer generation is numerically greater than that in the spring, the hot dry weather of June and July is less favourable for their development and egg-laying as there is less liquid food available. The amount of crop damage in the summer is therefore considerably less than that in the spring.—Wye College, Univ. London.

3049. HAHMANN, K., AND MULLER, W. K.

Zur Dauerwirkung der Kontaktinsektizide bei der Kohlfliegenbekämpfung. 2. Beitrag. (The persistence of contact insecticides against the cabbage root fly. 2nd communication.*)

NachrBl. dtsch. PflSchDienst., Braunschweig, 1953, 5: 49-53, bibl. 10, illus.

The application of lindane dust to the soil around the young plant in the field was found to give longer protection against *Chortophilus brassicae* on cauliflower than immersion of the roots in the insecticide or treatment of the plant hole prior to planting. In the case of unfavourable weather in April and May the main period of oviposition may be delayed till the beginning of June when a second application is advisable. *Hylemyia (Pegohylemyia) fugax* and *Drosophila (Scaptomyza) disticha* were also found causing losses to brussels sprouts in the Hamburg area. Larval galleries of the cabbage root fly were, for the first time, observed on cabbage heads which rotted as a result of the infestation.—Staatsinst. f. Angewandte Botanik, Hamburg.

3050. LANGE, W. H., JR., AND SCIARONI, R. H.

Metaldehyde dusts for control of slugs affecting brussels sprouts in central California.

J. econ. Ent., 1952, 45: 896-7, bibl. 1.

In field trials during September, 1951, 5% metaldehyde dust applied against grey garden slugs, *Derochers reticulatum* [= *Agriolimax agrestis*], and greenhouse slugs, *Milax gagates*, was found very effective, the best control being obtained in areas between the brussels sprouts where slugs were exposed to sunlight during the daytime. Further tests indicated that metaldehyde can be combined with parathion for combined action against molluscs and aphids, but in that case it might be desirable to reduce the metaldehyde content to 3% or 4%. The effects of metaldehyde on brussels sprouts have not been determined, but there is every indication that, used properly, dusts containing this chemical do not constitute a serious hazard to health. Metaldehyde dusts may also have a place for mollusc control in greenhouses, nurseries and lawns, but further investigation is necessary.

* For an abstract of Part I see *H.A.*, 22: 3802.

Celery and celeriac.

(See also 3159.)

3051. UNDERHILL, J. P., LORENZ, O. A., AND ZOBEL, M. P.

Celery fertilizer trials.

Veg. Crops Mimeo. Univ. Calif. 55, 1952, pp. 16.

The results are tabulated of 10 fertilizer experiments on celery carried out at various places on the highly organic, low mineral soils of the San Joaquin Delta from 1948 to 1951. It was evident that, even where fertilizer application did not produce significant increases in yield, the fertilized celery was better in quality and matured earlier than the unfertilized. Where preceding crops have not been heavily fertilized, a complete fertilizer supplying 100-200 lb. N, 100 lb. P_2O_5 and 100 lb. K_2O per acre should result in maximum yields. Where N, P or K are deficient, a 200 lb. dressing of the deficient nutrient is recommended. Split applications did not give better results than a single application immediately after transplanting.

3052. DAVIS, J. F., AND MCCALL, W. W.

Occurrence of magnesium deficiency in celery on the organic soils of Michigan. (A progress report.)

Quart. Bull. Mich. agric. Exp. Stat., 1953, 35: 324-9, bibl. 6, illus.

For the control of Mg deficiency in celery the tentative recommendation is made to apply sprays of 10 lb. per acre of magnesium sulphate at 10-day intervals throughout the growing season.

3053. YAMAGUCHI, M., ZINK, F. W., AND SPURR, A. R.

Cracked stem of celery.

Calif. Agric., 1953, 7 (5): 12, illus.

In field trials at several places boric acid sprays were found to control the occurrence of cracked stem in celery resulting from excessive N and/or K applications. Data are tabulated.—Univ. of California, Davis. [See also *H.A.*, 23: 1867 and 1868.]

3054. GERALDSON, C. M.

Studies on control of blackheart of celery.

Proc. Fla St. hort. Soc. for 1952, pp. 171-3, bibl. 13, being *J. Ser. Fla agric. Exp. Stat.*

117.

Nutrient culture experiments and analyses of plant tissue indicate that calcium deficiency or an unbalanced potassium-calcium ratio is a fundamental cause of blackheart of celery. The blackheart condition was controlled by daily application of calcium salts to the crown of the plants.

3055. GERSTNER, W.

Untersuchungen über die Biologie des Erregers des Sellerieschorfes (*Phoma apicicola* Klebahn). (The biology of *Phoma apicicola* on celeriac.)

Reprinted from *Wiss. Z. Martin-Luther Univ. Halle-Wittenberg*, 1952/53, 2: 83-126, bibl.

15, illus., as *Mathemat.-naturwiss. Reihe 2*.

The study of the biology of *Phoma apicicola* was undertaken with the object of improving its control. As high humidity and low temperature were found to favour

infection, incidence of root rot in celeriac decreased with late planting. Boron applications also reduced susceptibility. None of the varieties tested proved resistant though varietal differences exist, and not one of the three fungicides applied gave any protection to the crop. Another fungus causing root rot of celeriac was isolated and studied, but it has not been identified. The morphology of the two pathogens and the symptoms of affected plants are fully illustrated.

3056. GERSTNER, W., AND KLINKOWSKI, M.
Untersuchungen über den Sellerieschorf.
(Studies on celery root rot.)
Reprinted from *Dtsch. Landw.*, 1952, Hft 8,
pp. 2½, illus.

Several experiments were carried out on *Phoma apicola* in celeriac: (1) Time of planting. Susceptibility of young celeriac plants to the fungus decreased with the advancing season, as the results of the following, among other trials, show. The percentage of diseased tubers in plants inoculated immediately after planting out on 10 and 23 May, 14 June and 3 July decreased to 77, 38, 9 and 3·4 respectively. This finding is of interest to the seed grower to whom the reduction in tuber size associated with late planting is hardly a disadvantage. (2) The disease was shown not to be seed-transmissible, the soil being the only source of infection. (3) Certain herbs are added to the list of *P. apicola* hosts, which, with carrot and other crops, should be excluded from the rotation.—Inst. f. Phytopathologie, Aschersleben.

3057. SIMONS, J. N., AND SYLVESTER, E. S.
Acquisition threshold period of western
celery mosaic virus for four species of
aphids.
Phytopathology, 1953, 43: 29-31, bibl. 22.

None of the species, *Myzus persicae*, *M. solani*, *M. circumflexus* and *Aphis apii*, was able to acquire the celery mosaic virus in a 5-second feeding period, but all were able to pick it up in 10 seconds.—Univ. Calif.

3058. LOWNSBERY, B. F., STODDARD, E. M., AND
LOWNSBERY, J. W.
Paratylenchus hamatus pathogenic to
celery.
Phytopathology, 1952, 42: 651-3, bibl. 2,
illus.

During 1951 populations of this nematode as high as 10,000 per lb. of soil were found in fields of stunted and chlorotic celery plants in Connecticut, Massachusetts and New Hampshire. Stunted plants take longer to reach saleable size, and severely affected plants are never saleable. In greenhouse experiments *P. hamatus* produced the same stunting and chlorosis of celery associated with the nematode in the field. Disease severity is proportional to the *P. hamatus* population. Larvae and adult females containing eggs have been found feeding on diseased celery and dill roots.—Conn. agric. Exp. Stat. [See also *H.A.*, 22: 2565.]

3059. LINDHARDT, K.
Angreb af staengelål (*Ditylenchus dipsaci*)
på selleri. (Infestation of celeriac by the
stem and bulb eelworm.) [English summary
7 lines.]
Reprinted from *Gartner-Tidende*, 1952, No.
50, p. 1, illus.

This is the first record of celeriac infestation by *Ditylenchus dipsaci* in Denmark. The attack is confined to the tubers where it causes deep cracks in the surface and subsequent rotting. An illustrated description is given of the symptoms.—Statens plantepatologiske Forsøg, Lyngby.

3060. POWELL, A. A.
Trial of pre-cooling and rail transport of
celery.

N.Z. J. Agric., 1953, 86: 251, illus.
A transport trial was conducted with pre-cooled celery in 1952. On 12 March the celery was graded, packed in ventilated cardboard cartons and placed in a pre-cooling room maintained at 33-35° F. and a R.H. of 95%. On 17 March the cartons were loaded in an insulated railway wagon with an opening temperature of 66° F. Temperature records were kept of the celery in various parts of the wagon. Shortly after loading the temperature of the pre-cooled cartons averaged 44° F., that evening it was 41° F. and on arrival at its destination on 19 March, about 41 hrs after loading, it was 50·5° F. The celery was in excellent, fresh crisp condition and was favourably received by buyers.

Cucurbits.

(See also 2674, 3159, 3192, 3197e.)

3061. WHITAKER, T. W., AND BOHN, G. W.
Natural cross pollination in muskmelon.
Proc. Amer. Soc. hort. Sci., 1952, 60:
391-6, bibl. 7.

An experimental technique for measuring the amount of natural cross pollination in *Cucumis melo* is described. Extreme variation was found in the proportion of cross- and self-pollination of different flowers within individual hills and among different hills. The data suggest that cross-pollination was more frequent in hills in sheltered locations than in hills in locations exposed to greater wind movement. More cross-pollination was found in late flowers than in early flowers. The relation of cross-pollination percentages to honey bee behaviour is discussed. It is suggested that slight differences in the micro-environment, such as wind velocity, may influence bee behaviour and thereby exert a decided effect upon the amount of cross-pollination. [From authors' summary.]

3062. GROENEWEGEN, J. H.
Het enten van komkommers en meloenen.
(Grafting of cucumbers and melons.) [English
summary ½ p.]
Meded. Dir. Tuinb., 1953, 16: 169-83,
bibl. 10, illus.

Experimental work and practical observations on the grafting of cucumbers and melons on fusarium-resistant rootstocks is reviewed. In the South Holland glass district inarching of young plants is the most common method used for cucumbers. On *Cucurbita ficifolia* stock cucumbers produce good quality fruit and give a higher and earlier yield than ungrafted plants. They are more cold-resistant than ungrafted plants, but high temperatures, especially in the soil, have proved harmful. Grafted plants, however, are susceptible to leaf chlorosis and there is a risk of infection with *Cucumis* virus II during the grafting operation.

Grafting of melons is more difficult than that of cucumbers but union takes place more quickly. It is necessary to leave a shoot on the rootstock so that the number of leaves on the scion and stock are in the ratio of 3 to 1. The rootstock *Cucurbita pepo* var. *ovifera* produces a stronger plant than *C. ficifolia* but the fruit ripens slightly later. In contrast to cucumber, the crop is always later on grafted melons as the fruit continues to grow for a longer time. The best results have been obtained with the variety Orange Ananas.

3063. NAALDIJK.

Proeven met komkommer- en meloenentingen. (Trials on the grafting of cucumbers and melons.)

Jaarversl. Proefstat. Groent. Fruit. Glas., 1952, pp. 28-9.

- (1) In some heated glasshouses it has been observed that grafted cucumber plants develop a leaf chlorosis and crop poorly while ungrafted plants remain unaffected. This is thought to be due to the fact that grafted plants respond less well to high temperatures.
- (2) *Cucurbita pepo* var. *ovifera*, which is used as a rootstock for melons, has been found to be very heterozygous, so that it is difficult to obtain a pure line.
- (3) Sugar and net melons did well when grafted on *Cucurbita pepo* var. *ovifera* but tended to die off when grafted on *C. ficifolia*. In grafting, a good balance must be maintained between the number of leaves on the stock and scion. Grafting retarded the time of ripening of melon fruits.

3064. NAALDIJK.

Groeistofbespuiting op meloenen. (Growth substance spraying of melons.)

Meded. Proefst. Groent. Fruit. Glas., 1953, No. 3, p. 1.

In a trial at Naaldwijk Research Station sugar melons were sprayed 3 times during flowering, at weekly intervals, with the growth substance Kresiviet D in 5% solution. During the first week of harvest twice as many fruits were picked from the treated plants as from the untreated. Half of the total crop from the treated plants was 11 days earlier than the controls. The total weight of crop was not affected, but a larger number of smaller fruits was obtained. As small fruits are desirable for the home market, commercial trials with hormone sprays are recommended.

3065. HARRIS, C. S.

Effects of certain insecticides and related chemicals on photosynthesis in cucumbers and beans.

Proc. Amer. Soc. hort. Sci., 1952, 60: 335-40, bibl. 11.

In tests on cucumbers certain concentrations of DDT-xylene sprays and of octamethyltetraamidopyrophosphate soil applications depressed photosynthesis sharply. The responses of dwarf beans to similar treatments were slight. In the cucumber tests there was evidence that in some cases the initial depression in photosynthetic activity may be reversed with the lapse of time. Other chemicals may move through the plant and cause foliar necrosis and chlorosis without affecting the rate of apparent photosynthesis.—Ohio agric. Exp. Stat.

Legumes.

(See also 2462, 2474, 2516p, 2517e, 2985, 3159, 3196b, p. t.)

3066. NORTH, C., AND SQUIBBS, F. L.

A description of dwarf french bean varieties grown in the United Kingdom.

J. nat. Inst. agric. Bot., 1952, 6: 196-211, bibl. 4, illus.

A description and classification of the 28 dwarf french bean varieties at present grown in the U.K. is presented. No comprehensive description has been published in English in recent years and the lack of it favours the coining of unnecessary new names, the multiplicity of which causes confusion. The chief diagnostic characters are seed, hypocotyl, habit and leaf character, flower colour, pod and maturation. A key to, and a description of, the varieties are given.

3067. HYLMÖ, B.

Trädgårdsbönor. (Haricot beans.)

Reprinted from *Svensk Växtförlädl.*, [1952?], pp. 208-17, bibl. 1, illus.

Present-day haricot bean varieties and improvements desirable are discussed.

3068. BURKART, A., AND BRÜCHER, H.

Phaseolus aborigineus Burkart, die mutmassliche andine Stammform der Kulturbohne. (*Phaseolus aborigineus* Burkart, the apparent ancestor of the common garden bean in the Andes.) [English summary 1 p.]

Züchter, 1953, 23: 65-72, bibl. 30, illus.

Phaseolus aborigineus, a vigorous annual climber found in north-west Argentina, has good flavour and is resistant to late frost of -4°C ., but on the whole the species offers little promise for the improvement of bean varieties.

3069. BADINA, G.

Beans in the Leningrad province. [Russian.]

Kolhoz Proizv., 1953, No. 3, p. 62.

[French] bean varieties suitable for both fresh and dried consumption are recommended. They should be sown when the soil temperature at a depth of 10 cm. is not lower than $12-14^{\circ}\text{C}$., i.e. around Leningrad about the third week in May. The seed should be stratified or preferably soaked in hot water, as the hot water treatment in addition to improving earliness and yields gives good control of anthracnose.

3070. LEOPOLD, A. C., AND GUERNSEY, F. S.

Flower initiation in Alaska pea. I. Evidence as to the role of auxin.

Amer. J. Bot., 1953, 40: 46-50, bibl. 22, being *J. Pap. Purdue Univ. agric. Exp. Stat.* 619.

The effects of added materials upon flower initiation in *Pisum sativum* var. Alaska have been studied, employing a technique involving 4-hour soaking of seedlings and taking the position of the first flower as a measure of flower initiation. It was found that (1) the node of the first flower can be altered experimentally; (2) naphthaleneacetic acid at $18-20^{\circ}\text{C}$. quantitatively inhibits flowering; (3) flowering is strongly modified by the temperatures experienced in the first few days after germination, the optimum for early flowering being $18-22^{\circ}\text{C}$.; (4) NAA applications, which inhibit

flowering at high temperatures, promote it at lower temperatures; (5) flowering inhibitions by metabolites such as sucrose, malic acid and arginine are reversed by the addition of NAA.—Purdue Univ., Lafayette, Indiana.

3071. FUCHS, W. H., AND MÜHLENDYCK, E.

Über den Einfluss der Aussaatzeit und der Temperatur auf die Entwicklung von Erbsensorten. (On the influence of time of sowing and temperature on the rate of development in pea varieties.)

Z. Pflanzenz., 1951, 30: 172-87, from abstr. in Züchter, 1953, 23: 155.

The trials, which included very early and late sowings, showed that the length of time from germination to appearance of first flower in peas depends on the date of sowing. The minimum length of that period, however, is characteristic of the variety and independent of seasonal weather fluctuations. Early varieties respond to exceptionally early dates of sowing with an extension of the pre-flowering period by 15 days and late varieties by 30 days. Besides day length temperature was found to have an important influence on flowering time to the extent that mean temperature sums are a varietal characteristic within the range of normal sowing dates (April-July). Photoperiodic effects, which attain a maximum at 14-14½ hours' daily illumination, are thought to be of a qualitative nature. Short days seem to inhibit, long days to promote, flowering, possibly owing to the higher auxin level associated with short days. Of the varieties tested only the early ones (with the lowest temperature sums) were found to be insensitive to the short day influence. The relation between higher temperature sums and photoperiodic sensitivity is discussed.

3072. REATH, A. N., AND WITWER, S. H.

The effects of temperature and photoperiod on the development of pea varieties.

Proc. Amer. Soc. hort. Sci., 1952, 60: 301-10, bibl. 15, illus., being J. Art. Mich. agric. Exp. Stat. 1323.

Pea varieties, representative of important commercial types, were grown in the greenhouse at 9-, 12- and 16-hour photoperiods each at 50° and 60° F. night temperatures and in successive field plantings. Observations as to days requisite to flowering, days to maturity, degree-days from seeding to flowering, pod characteristics and vine heights suggest that both photoperiod and temperature have a marked influence. At 60° F. night temperature Alaska and Surprise were day-neutral with respect to flowering and pod production, but at 50° F. flowering was hastened by long days. Other varieties (Gradus, Alderman, Walah, Early Perfectah, Idaho Whites, Pride, Wando) behaved as long-day plants at both 50° and 60° F. night temperature. In all midseason and late pea varieties the number of degree-days required for flowering was reduced progressively by exposure to 12- and 16-hour photoperiods. For field plantings the multiple of degree days summation and average length of daylight was found to be a less variable expression than the heat sum alone. Some aspects of the data presented are discussed in the light of present knowledge of the effects of temperature and photoperiod as factors controlling the behaviour of pea varieties. [Authors' summary.]

3073. MACGILLIVRAY, J. H., AND OTHERS.

Spacing effect on the yield of green lima beans for freezing.

Proc. Amer. Soc. hort. Sci., 1952, 60: 330-4, bibl. 11.

Three experiments in California are reported involving 3 varieties of lima bean sown in rows 30 in. apart and spaced 4, 8 and 16 in. apart in the rows. Yields of green beans were generally highest at 4-in. spacing with 8-in. spacing only slightly inferior, which suggests that spacings of 4 to 6 in. would be a sound practice. Yields of the desired green beans were generally 30% to 50% higher than yields of dry beans from the same fields.

3074. IJIMA, T.

On the physiology and utilization of vitamin B₁ in garden crops. (1) The effect of vitamin B₁ on the germination of kidney beans. [Japanese.]

J. hort. Ass. Japan, 1952, 21: 117-22, bibl. 12.

Seeds of Kentucky Wonder and Masterpiece kidney beans, Golden Bantam maize and Miyashige Japanese radish were soaked in solutions of various concentrations of vitamin B₁ for 24 hours prior to sowing. Vitamin B₁ was used in concentrations ranging from 0.0000001 to 100 p.p.m. In these tests vitamin B₁ functioned as an activator for germination, accelerating the growth of plumules and radicles, especially at an early stage of germination, and also increased the percentages of germination in old seeds. Optimum concentration of vitamin B₁ was found to be 0.01 p.p.m. Vitamin B₁, contained in cotyledon, plumule and radicle germinated in dark and light chambers, was measured by the Permutit-thiocrom method, and it was found that concentration as well as amount per seed of B₁ decreased as dry matter decreased with the progress of germination in dark, but increased rapidly on exposure to light; vitamin B₁ changed from the free type to the ester type as germination progressed, and the B₁ increased by exposure to light was of the ester type. Measurement of Bf contained in 1- to 4-year-old seeds showed that concentrations and amounts of both free and ester types decreased with age, though B₁ was still found in seeds which had entirely lost their power of germination. The vitamin B₁ content in cotyledons developed from the seeds treated with B₁ at a concentration of 0.05 p.p.m. increased by 150-180%. Respiration increased in the seeds treated with B₁. Y.A.

3075. COOKE, G. W., AND DADD, C. V.

Fertilizer placement experiments on threshed peas.

Agriculture, Lond., 1953, 60: 34-8, bibl. 1.

Results of trials with threshed peas carried out over the last six years on soils where phosphate and potash are low, show that by far the greatest response is obtained by placing the fertilizer at the side and slightly below the seed. [Authors' summary.] Yield data from several treatments are tabulated.

3076. TREMBLAY, F. T., AND BAUR, K. E.

Plant analysis—a method of determining the phosphorus requirements of peas.

Agron. J., 1952, 44: 614-18, bibl. 4.

Field experiments with peas in western Washington have shown that P is the most important nutrient for

maximum yields in certain circumstances [see *H.A.*, 19: 2161]. The present study shows that the tops or leaves at the third node from the top serve best as indicators of P status, that the best time for sampling is between the 4- and 8-node stages, and that significant correlations exist between the yields of shelled or market peas and the P content of the tops and leaves. The critical level of P content of tops at the 4- to 8-node stages is tentatively placed at 2,000 p.p.m.

3077. SHUKLA, T. C.

Root development in *Lens esculenta* Moench.
Curr. Sci., 1953, 22: 17.

From examinations of the root systems of 3 varieties of lentil at different stages up to 63 days from sowing it is concluded that the root system occupies the soil to a depth of about 17 cm. and extends laterally to a radius of about 11 cm. This suggests that cultivation should be done to a depth of about 7 in. and that the plants should be spaced about 4.5 x 4.5 in.

3078. HOFFMAN, J. C., AND KANAPAUX, M. S.

Relation of crude fiber and dry matter contents to appearance and water loss of snap beans.

Proc. Amer. Soc. hort. Sci., 1952, 60: 363-6, bibl. 5.

It is concluded from a study involving 10 varieties of snap bean that differences in appearance (wilting) of pods during periods of up to 144 hrs after harvest were not related to either dry matter or crude fibre content. Water loss and appearance were also unrelated except in the smallest of 4 size grades.

3079. BLAIR, I. D., AND COPP, I. G.

Pea seed disinfection: a statistical study.
N.Z. J. Sci. Tech., Sect. A, 1953, 34: 397-404, bibl. 11.

Treated peas, variety William Massey, were sown in the field on successive occasions from spring to autumn for several crop seasons. Statistical analyses of transformed data revealed significant differences between sowing dates in the emergence counts obtained. After some mid-summer sowings, untreated seed germinated as well as any disinfected line, whereas after some autumn sowings all treatments were significantly better than untreated. Over all sowing dates, tetramethyl thiuram disulphide (Premasan) and tetra-chlor-p-benzoquinone (Spergon) were highly effective in improving field emergence. The locally supplied organic mercury dusts and the used-oil treatment produced little benefit, although in an experimental set, dusts with twice the normal mercury content were effective. In a glasshouse pot trial, soil moisture was found to have a greater influence on emergence than temperature. [Authors' summary.]—Plant Diseases Div., D.S.I.R., Lincoln.

3080. FLAMINI, S.

Azione di prodotti antiparassitari sulla germinabilità e sull' energia germinativa di alcune semi agrarie. (The effect of fumigants on the germination rate and vigour of certain agricultural seeds.)
Ann. Fac. Agrar. Perugia, 1950, 7: 192-8

[received 1953].

The effect on the germination rate and vigour of broad bean (among other) seeds of leaving certain fumigants in contact with them for 3 and 6 months was studied.

The fumigants tested were Geigy 33 and Gesarol (DDT products), Toxin p. and Tiogamma (BHC products) and Caffaro dust (a Cu product). There was little difference in germination rate and vigour as between the 2 treatments but the germination rate of seed treated for 180 days was in all cases significantly greater than that of untreated seed.

3081. JOHNSON, J. C.

Common bean mosaic yield trial, 1952.
Qd agric. J., 1952, 75: 350-2, illus.

The effects of common bean mosaic on 2 susceptible strains of the Brown Beauty variety of green bean [*Phaseolus*] were observed in a randomized block trial with 8 replications, conducted at Redlands Experimental Station, to determine the extent to which this widely grown variety is affected. The strains showed a yield reduction of 15% on the main pick when infected.

3082. THOMAS, H. R., AND ZAUMEYER, W. J.

A strain of yellow bean mosaic virus producing local lesions on tobacco.
Phytopathology, 1953, 43: 11-15, bibl. 10, illus.

Severe-yellow-mosaic virus, which causes strong epinasty, chlorosis and veinal necrosis of the inoculated primary leaves followed by top necrosis and death of certain bean varieties and severe systemic mottle in others, was isolated from a snap bean plant in Idaho. It was infectious to all varieties of bean tested with the exception of Great Northern U.I. 123, 31, and 16. Except for yellow necrotic lesions on *Nicotiana tabacum*, *N. rustica* and *N. sylvestris*, no infection was obtained outside the Leguminosae. Because of the similarity of properties and particularly of host range and of symptoms produced on beans the virus is classified as a severe-yellow-mosaic strain of yellow bean mosaic virus.—Plant Ind. Stat., Beltsville, Md.

3083. KLINKOWSKI, M.

Die "Bohnenwelke" der *Phaseolus*-Arten, die Bronzefleckenkrankheit der Tomate, die Vergilbungskrankheit und das Gelbnetz-Virus der Rüben. (Bean wilt of *Phaseolus* spp., spotted wilt of tomato, yellows and yellow net virus of beet.)

Reprinted from *Dtsch. Landw.*, 1952, Hft. 12, pp. 4, illus.

Among the virus diseases only recently discovered in Germany are a bean wilt and spotted wilt of tomato. The first symptoms of bean wilt are a slight wilting of the top leaves at the time of flowering or the beginning of pod formation followed rapidly by a general wilt and the death of the plant. Grafting experiments have shown that the symptoms are a hypersensitive reaction of certain varieties to the bean mosaic virus. Dark necrotic spots on root, stem, foliage and pods associated with the wilt make it probable that the trouble is identical with "black root" described in the United States in 1940. Spotted wilt of tomato was first recorded in Germany in 1950.

3084. MASTENBROEK, C.

Bestrijding vetylkenziekte en landbouwstambonen. (Control of halo blight in haricot beans.)

Meded. "Centraal Bureau" A.G., 1952, 36: 49-50, from English abstr. in *Euphytica* 1953, 2: 84-5.

Halo blight (*Pseudomonas phaseolicola*) of haricot beans is spread by rain and wind from secondarily diseased plants that are infected through the seed. In order to reduce the incidence of the disease, resistant stocks were chosen as initial material in a breeding programme started in 1942. Selections from the white bean of Walcheren were resistant but proved to have certain undesirable qualities. The American variety Mexican 34 proved to transmit resistance very well. A new variety of brown haricot bean, immune from halo blight and adapted to the climatic conditions of the Netherlands, has been developed.

3085. BRUINSMA, F., AND LABRUYÈRE, R. E.
Bestrijding van de vlekkenziekte in zaadbonen (*Colletotrichum lindemuthianum*). (Control of anthracnose in French beans grown for seed.)

Meded. Dir. Tuinb., 1953, 16: 243-52, illus.

Experiments carried out from 1950 to 1952 showed that good control of anthracnose can be obtained by zinc ethylene-bisdiethiocarbamate applied 4-6 times during the season at a concentration of 1: 200. Apart from giving increased yields of seed, control by this method was justified economically.

3086. ANON.
Anthracnose of french beans.

Agric. Gaz. N.S.W., 1952, 63: 654-6, illus.

Notes are given on anthracnose of french beans caused by *Colletotrichum lindemuthianum*. At least 2 strains occur. Recommended control measures are: use of healthy seed, crop rotation (at least 2 years' interval required), use of resistant varieties, and fungicidal treatment of young crops after roguing.

3087. KERLING, L. C. P.
Voetziekten bij erwten, een gevolg van stuivende grond. (Footrot of peas caused by blowing sand.) [English summary 1 p.]

Tijdschr. PlZiekt., 1953, 59: 62-71, bibl. 6, illus.

Foot rot of peas caused by weak parasites may occur after damage by drifting sand or sand storms in early spring. Experiments were carried out to determine under what conditions plants become infected. Sand, water or a mixture of the two was blown onto the stems of young pea plants prior to inoculation with *Fusarium avenaceum* or *F. solani*. Plants exposed to water only showed a slightly water-congested condition of the stem and did not become infected. In plants exposed to sand or sand and water a more serious water-congested condition occurred with heavy infection, especially from inoculation of mycelium. Further experiments showed that heavy water soaking without wounding was sufficient to permit infection. It is concluded that plants in the field may recover from damage by sand not infected with spores, but that plants wounded by sand may be easily infected by spores splashed up by heavy rain.

3088. COSPER, H., AND SCHUSTER, M. L.
Effect of urea on the incidence of bean rust.

Agron. J., 1953, 45: 74-5, illus., being *Pap. J. Ser. Neb. agric. Exp. Stat. 575.*

In a series of 5 greenhouse trials on field beans a marked reduction in the number of rust (*Uromyces phaseoli typica*) pustules resulted from spraying the plants with

1% urea or with 200 p.p.m. Dreft (sodium lauryl sulphate) and a further reduction from urea and Dreft combined. The standard sulphur dust treatment, however, remained the most effective method of control. In laboratory tests in artificial media urea at 1, 2 and 3% and Dreft at 200 p.p.m. had an inhibitory effect on spore germination and germ tube growth, germination being nil with 3% urea. A decrease in the severity of rust had previously been observed in field trials in which beans had been sprayed with 3% urea as a nitrogen fertilizer.

3089. LANGE, W. H., JR., CARLSON, C., AND BASKETT, R. S.
Pests of red kidney beans.

Calif. Agric., 1953, 7 (4): 11.

Field trials, carried out at Linden in 1952, showed 1.5% dieldrin + 3% aramite or 2% parathion to be the most effective insecticide-acaricide mixture tested against *Tetranychus bimaculatus* and *Liriomyza subpusilla*. The dust was applied by aeroplane at the rate of 40 lb. per acre when most of the pods were set, i.e. about 30 days from harvest. A single treatment proved very satisfactory, giving a considerable increase in yield above that of the controls.

3090. MIDDLEKAUFF, W. W., AND STEVENSON, E. E.
Insect injury to blackeye bean seeds in central California.

J. econ. Ent., 1952, 45: 940-6, bibl. 9, illus.

The data given show that the bugs *Lygus hesperus* and *L. elisus* were responsible for most of the insect damage to blackeye bean seeds harvested from undusted fields. Lesser injury was caused by lima bean pod borer (*Etiella zinckenella*), corn earworm (*Heliothis armigera*), western yellow-striped armyworm (*Prodenia praeifica*), and cowpea weevil (*Callosobruchus maculatus*). Applications of 5% DDT, 5% DDT-50% sulphur or 10% toxaphene gave very good control of all the insects encountered except the lima bean pod borer.

3091. WEDDING, R. T., AND METCALF, R. L.
Translocation of radioactive octamethyl pyrophosphoramidate in Black Valentine bean plants.

Bot. Gaz., 1952, 114: 180-9, bibl. 14, being *Pap. Univ. Calif. Citrus Exp. Stat. 738.*

Translocation of systemic insecticide measured by radioactive tracers.

Calif. Citrogr., 1953, 38: 138, 140, 142, bibl. 2.

The systemic insecticide OMPA, labelled with P^{32} , tended to accumulate more rapidly in the younger than in the older tissues of stems and leaves of bean plants. After uptake from the soil the material moved through the stems at an approximate rate of 20 cm./hr. Less than 1% of the material added to the soil was recovered from the above-ground portions of the plant after 120 hrs. The P^{32} -containing compounds detected in the plant were toxic to insects. Insecticidally inactive breakdown products of OMPA were found after 8 days.

3092. DUDLEY, J. E., JR., AND BRONSON, T. E.
The pea aphid on peas and methods for its control.

Fmr's Bull. U.S. Dep. Agric. 1945, revised 1952, pp. 13, illus.

Information is given on the damage caused by the pea aphid, *Macrosiphum pisi*, its host plants, biology and control by rotenone, DDT, TEPP and parathion.

3093. TAYLOR, L. F., APPLE, J. W., AND BERGER, K. C.

Response of certain insects to plants grown on varying fertility levels.

J. econ. Ent., 1952, 45: 843-8, bibl. 10.

Neither field nor greenhouse tests, conducted in Wisconsin, showed any significant difference in the reproductive capacity of pea aphid, *Macrosiphum pisi*, on pea plants grown at high and low levels of N, P and K.

3094. DITMAN, L. P., AND BURKHARDT, G.

Further experiments on pea aphid control.

J. econ. Ent., 1952, 45: 880-1, bibl. 1, being *Sci. Art. Md agric. Exp. Stat. A.360.*

Low volume water sprays of DDT and 4049 emulsion were superior to 1% DDT and 1% parathion dusts in these tests. At the dosages used, the 4049 spray was superior to DDT although control was at a satisfactory level with either substance. Seed treatment followed by two subsequent DDT emulsion sprays did not result in satisfactory control of pea mosaic disease in small plots. A low volume spray boom designed and described was highly satisfactory in experimental and commercial use. [Authors' summary.]

3095. LOWIG, E.

Der Speisebohnenkäfer, eine ernste Gefahr für die Lagerbestände. (The American seed beetle, a serious threat to stored beans.)

Saatgut-Wirtsch., 1953, 5: 6-8.

The author made observations on the biology of the American seed beetle, *Acanthoscelides obtectus*, in beans (*Phaseolus vulgaris*) stored for seed, and conducted preliminary trials on its control. He recommends treatment of the seed with DDT or BHC and storage in closed bags at a warm temperature [not specified] to hasten the development of the grubs. As the beetle emerges it comes into contact with the insecticide.

3096. SCHULZE, K.

Auftreten des Speisebohnenkäfers in Berlin. (Incidence of the American seed beetle in Berlin.)

Schädl. Bekämpf., 1951, 43: 39-40, from abstr. in *Z. PflKrankh.*, 1953, 60: 211.

For some years *Acanthoscelides obtectus* has been observed as a pest of beans in the field. Disinfection was carried out by heat treatment (55° C. for 1 hour) immediately after harvesting.

3097. BRINDLEY, T. A., CHAMBERLIN, J. C., AND SCHOPP, R.

The pea weevil and methods for its control. *Fmr's Bull. U.S. Dep. Agric.* 1971, revised 1952, pp. 24, illus.

The principal sources of pea weevil (*Bruchus pisorum*) infestation are peas shattered on the field, volunteer peas, pea hay and infested seed. Information is given on the life history and habits of the weevil, control with rotenone, DDT or methoxychlor dusts on different types of pea crops, dusting equipment, use of border trap strips, and sanitation practices.

3098. SPEYER, W.

Die vom Blattrandkäfer verursachten Schäden und ihre Verhütung. (Injuries caused by the pea weevil and their prevention.)

Gesunde Pfl., 1951, 3: 221-2, from abstr. in *Z. PflKrankh.*, 1953, 60: 208.

Injuries to the root nodules of peas by larvae of *Sitona lineatus* made it possible to test, in two experiments, the significance of these organs for the plant: (1) Pea roots (a) with nodules intact, (b) with nodules damaged by the weevil, were added to poor soil in pots; to a third lot (c) no roots were added. The chlorophyll content (as indicated by leaf colour) of barley sown in these pots was a > b > c. (2) In field trials BHC was worked into the soil to the side of pea rows (4-8 g. per metre of row). The roots of treated plants contained considerably more nodules than the controls with a resulting increase in pod yield of over 50%.

3099. KOURMOUSSIS, A. G.

Rapport sur les travaux de lutte contre le *Sitona limosus* Rossi, ennemi des légumineuses dans la Morée. (Experiments on the control of *Sitona limosus*, a pest of legumes in Morea.)

Ann. Inst. phytopath. Benaki, 1952, 6: 23-31, bibl. 11.

Notes are given on the systematics and geographical distribution of the weevil *Sitona limosus*, a pest of beans, peas and other legumes in Greece. Laboratory and field experiments showed that the following treatments will give good control. (1) Dusting with BHC, 10-12% gamma isomer, at time of sowing, the application being repeated if necessary. (2) Two applications of 10% DDT dust at 10-15 days' interval. (3) Two sprays of 2.5-4.0% DDT wettable powder containing 50% active material, or 2.5% parathion wettable powder containing 15% active material, or 2.5% emulsifiable chlordane containing 74% active material, the second application being made 10-15 days after the first.

3100. SAALTINK, G. J.

Proeven over de zaadbehandeling tegen de bonenvlieg, *Delia (Chortophila) cilicura* Rond. (Experiments on seed treatment for control of the bean seed fly, *Delia cilicura*.) [English summary 4 lines.]

Tijdschr. PlZiekten, 1953, 59: 33-4.

Good control of the bean seed fly was obtained in field trials in 1952 by treating the seed with lindane. The dosage recommended is 5 g. 20% lindane per kg. seed. Soil treatment with lindane, BHC or parathion gave no control.—*PlZiekten. Dienst, Wageningen*.

3101. SPEYER, W.

Bekämpfung des Erbsenwicklers (*Laspeyresia nigricana* Steph.). (The control of pea moth.)

Jber. biol. Bundesanst. Braunschweig 1951, 1952, p. 65.

Among 45 pea varieties under observation at Kiel-Kitzeberg the dwarf varieties appeared to be the least subject to attack by the pea moth. Five applications of a DDT preparation gave an appreciable reduction of infestation. [See also *H.A.*, 21: 3595.]

3102. PARKER, H. L.

Parasites of the lima-bean pod borer in Europe.

Tech. Bull. U.S. Dep. Agric. 1036, 1951, pp. 28, bibl. 11, illus. [received 1953].

The lima-bean pod borer (*Etiella zinckenella*) has become increasingly abundant in lima beans on the western coast of the United States. Various parasite species imported from France and Hungary are discussed.

3103. ENTOMOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.

A false looper.

Agric. Gaz. N.S.W., 1953, 64: 147-8, illus.

Notes are given on the false looper (*Plusia chalcites*), a defoliating pest of beans and other vegetables and soft-foliate pot plants, and its control.

3104. STONE, M. W.

Effect of winter cover crops on wireworm injury to the dry lima bean crop.

Tech. Bull. U.S. Dep. Agric. 1039, 1951, pp. 20, bibl. 10, illus. [received 1953].

Experiments were carried out in California from 1939 to 1944 to test the theory that winter cover crops ploughed under late (March or April) in lima bean fields increase the population of the sugar beet wireworm (*Limonius californicus*) by providing protection for the adults during the egg-laying season. A study was made of the effect of 5 green manure crops (barley, mustard, sweet clover, purple vetch and fenugreek) with winter fallowing as a control. In the fallowed plots wireworm infestation was light and the stand of plants good. The barley plots were preferred by most ovipositing adults, the fallow plots least. Barley, mustard and sweet clover were responsible for the build-up of wireworm populations. With increases in wireworm infestations there were corresponding decreases in number of plants and usually in yield of dry lima beans. In general early ploughing of the crops, in February, tended to prevent increases in wireworm populations, particularly in the sweet clover plots. The decrease in yields in the barley and mustard plots may have been partially due to depletion of soil nitrogen.

3105. MCGREGOR, W. G., HANSEN, D. R., AND MAGEE, A. I.

Artificial defoliation of field beans.

Canad. J. agric. Sci., 1953, 33: 125-31, bibl. 2, being *Contr. Cereal Div., exp. Fms Serv., Dep. Agric., Ottawa*, 167.

Field tests at the Central Experimental Farm, Ottawa, in 1949-51 showed that it is possible and practical to hasten the maturity of field beans by the use of chemical defoliants. Ca cyanamide and monosodium cyanamide as dusts and K cyanate, ammonium thiocyanate, dinitro weedkiller and 2,4-D (amine) as sprays were applied at various rates either (1) when the pods were well formed and the leaves quite green or (2) when the pods were still somewhat green but the lower leaves had passed the yellowing stage. Monosodium cyanamide and ammonium thiocyanate sprays at 30 lb. in 60-gal. water and 12.5 lb. in 20 gal. water per acre respectively were the most successful; each gave excellent defoliation and hastened maturity by 7-10 days. Too early an application may cause a considerable reduction in yield.

Defoliation did not affect degree of shattering or shelling during pulling, or threshing efficiency.

3106. FORTIER, R. J.

Status of the mechanical bean picker.

Proc. Fla St. hort. Soc. for 1952, pp. 177-80, illus.

An account is given of the design and performance of the Chisholm-Ryder snap bean harvester, developed in 1950. The efficiency of the machine depends on specific characteristics of the plant which vary widely with variety. The suitability of different varieties for mechanical harvesting is compared and it is concluded that, although the Tendergreen types are well adapted, the ideal variety has yet to be produced. It is considered that the modern bean harvester are designed on a satisfactory principle but that certain modifications are still desirable.

3107. SYKES, S. M.

Some quality factors in the freezing of peas.

Food Pres. Quart., 1952 (issued 1953), 12: 3-11, bibl. 8, and *Agric. Gaz. N.S.W.*, 1953, 64: 73, 102-5, bibl. 8.

A graph illustrating the relation between maturity at harvest (as indicated by the percentage of alcohol-insoluble solids) and acceptability to consumers shows that peas with A.I.S. values of 10-14% should yield a satisfactory frozen product. From data on the effect of handling on quality it is evident that a delay of two hours before blanching may cause deterioration in mechanically harvested and hulled peas. Pre-cooling treatment and varieties suitable for freezing under New South Wales conditions are also discussed.—C.S.I.R.O., Homebush, N.S.W.

3108. TOWNSEND, L. R.

Pectin-methylesterase in pea vines.

A.R. Canada Dep. Agric. Fruit Veg. Prod. Res. Cttee 1951, pp. 5.

It is shown that pea vines are a good source of the enzyme used for de-esterification in the manufacture of commercial low ester pectins.

Mushrooms.

3109. HOFFMAN, I. C.

Mushrooms. How Americans use vitamins.

Grower, 1953, 39: 544.

Experiments in Ohio have shown that applications of thiamin (vitamin B₁), at 0.5 mg./sq. ft. of mushroom bed, given in 6 treatments at 10-day intervals starting before casing resulted in an increase in yield of more than 49% over the untreated beds. A mixture of the B vitamins at the following rates, thiamin 0.5 mg., riboflavin 1.0 mg., niacin 12.5 mg. and pantothenic acid 3.75 mg. per sq. ft., gave yield increases of more than 50%. The vitamins gave better results over long cropping periods than over short ones. Good results were also obtained with the activated sludges BY-500, milorganite and cyclone waste, which contain large amounts of vitamins B, when mixed with the compost as the beds were filled.

3110. FRAMPTON, F. R.

Another heating system—high velocity low pressure hot water.

Bull. Mushroom Grs' Ass., 1953, No. 39, pp. 75-6.

A description is given of the high velocity, low pressure hot water system for heating mushroom houses. It is defined as one in which the temperatures of the flow and return are so close that the pipe shows no significant change in heating power along its length. This is best done in 1½- to 2-inch pipes with a temperature gradient of 15° F. and a maximum of 180° F. A list is given of the advantages of this method in comparison with a 4-inch low pressure system and the low pressure steam system. Its disadvantages are that there is no steam for sterilization and pumping costs are high, but the author claims that it is the cheapest system to install and the most efficient in heating value per lb. of fuel.

3111. STOLLER, B. B.

Trace elements for mushroom culture.

Bull. Mushroom Grs' Ass., 1953, No. 39, pp. 78-85, bibl. 21.

The functions of the trace elements and their effect on mycelial growth are discussed, chemical analyses of mycelium and sporophore are given, and experiments with trace elements in manure and synthetic composts are described. It is concluded that the addition of a combination of Al, Fe, Zn, Mn, Cu and B should give a yield increase with synthetic composts, with inorganic N sources, and may do so with manure compost if the yield is usually low. Gallium, cobalt, vanadium, and chelates of trace elements should be tested for their effect on yield.

3112. MORETON, B. D.

Eelworms as pest of mushrooms.

Bull. Mushroom Grs' Ass., 1953, No. 41, pp. 149-52.

Measures for the control and prevention of *Ditylenchus destructor* are recommended. *Control.* Infested beds and boxes should be destroyed. Infected buildings should be steam-sterilized at 150° F. or more for several hours, all surfaces having been thoroughly wetted 24-48 hrs beforehand to activate the eelworms. A procedure suggested for bedboards is to dip them in a hot bath of 2% cresylic acid as nearly boiling as possible for 20 mins and then transfer into a cold bath of the same compound. *Prevention.* Casing soil should be steam-sterilized at 150-180° F. for at least 20 mins. The surface of composting sites should be cemented and should be soaked with 2% cresylic acid. Peak heating is the best means of preventing eelworms from reaching dangerous levels.

Okra.

3113. VENKATARAMANI, K. S.

A preliminary study of some inter-varietal crosses and hybrid vigour in *Hibiscus esculentus* L.

J. Madras Univ., Sect. B, 1952, 22: 183-200, bibl. 22, illus.

Six varieties of okra were used in an investigation to determine the effect of crossing on plant characters and the possibilities of exploiting hybrid vigour to increase yields. The F₁ hybrids flowered as early as, or earlier than, the early flowering parent, and in general produced more fruits per plant and higher total yields than the parents.

3114. PERKINS, D. Y., MILLER, J. C., AND DALLYN, S. L.
Influence of pod maturity on vegetative and reproductive behavior of okra.
Proc. Amer. Soc. hort. Sci., 1952, 60: 311-14, bibl. 2, illus.

In an experiment with 3 okra varieties in Louisiana plants harvested every 3 to 4 days bore 3 times as many pods as did plants on which the pods were allowed to mature. In the former bearing was often continuous. In the latter plant growth was severely checked and bearing occurred in a series of waves.

Onions and related crops.

(See also 25161, 3197d, i.)

3115. VAN BEEKOM, C. W. C.
Uien en sjalotten. (Onions and shallots.)
[English summary 7 pp.]
Meded. Tuinb. Voorlicht. Dienst 49, 1952, pp. 132, bibl. 130, illus., fl. 2.50.

The purpose of this thesis is to illustrate the importance of scientific research in developing crop plants, taking onions and shallots as examples. Their history, economic importance, their culture before specialized research was undertaken, and the present situation arising from research instituted by the Netherlands Onion Federation are discussed. Variety investigations with onions have shown that there are four types, from which varieties have been obtained by breeding. The Rijnsburg and North Holland straw-coloured are both yellow types giving heavy yields and keeping fairly well. The more reddish Zeeland brown type stores better than the two yellow types but is more subject to neck rot. The North Holland blood red type, which is only of local importance, gives low yields but is an excellent keeper. Undesirable red colouring has been largely eliminated by breeding. Foreign varieties have been disappointing in Holland, partly owing to differences in day lengths in their countries of origin. Many also proved very susceptible to onion downy mildew (*Peronospora schleideni*) under Dutch conditions. Variety tests with shallots showed that the North Holland straw-coloured and Groningen shallot gave higher yields than the Ouddorp brown one. Breeding for heterosis in onions is recommended. Notes are given on the application of NPK fertilizers, sowing in rows, the use of chemicals in weed control, planting distances, the control of diseases and pests, and storage problems.

3116. USTINOVA, E. I.

Anomalies in the construction of inflorescence and flowers of onions. [Russian.]

Bot. Zhurnal, 1953, 38: 142-5, bibl. 6, illus.

At the Moscow Agricultural Academy abnormalities were found in the reproductive organs of 16 of the 40 *Allium* spp. examined.

3117. KOHMAN, E. F.

Onion pungency and onion flavour: their chemical determination.

Food Technol., 1952, 6: 288-90, from abstr.
in *Brit. Abstr. C*, 1953, Pt. 1, No. 171.

The onion owes most of its flavour to the decomposition of its allyl propyl disulphide glucoside. By the steam distillation of onion pieces at 15 lb./sq. in. (121° C.) the

glucoside can be decomposed to liberate the allyl propyl disulphide flavour component. The method is described and a few results given.

3118. MUKHERJEE, K. L., AND KUMAR, K.
Effect of nutrient deficiencies and hormone treatment on respiration rate of onion.
Sci. and Cult., 1953, 18: 437-8, bibl. 3.

The combined effects of N, P and K deficiencies and hormone treatment on the respiration rate of onion bulbs were studied. Respiration increased under all treatments for 75 days and then declined. K deficiency resulted in a higher initial increase than N and P deficiency. IAA treatment depressed respiration in the case of K and NPK deficiency and activated it, though not significantly, in the case of N and P deficiencies.—Banares Hindu University.

3119. NYLUND, R. E.
The response of onions to soil and foliar applications of manganese and to soil applications of other trace elements.
Proc. Amer. Soc. hort. Sci., 1952, 60: 283-5, bibl. 2, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2804.

In 1950 growth, leaf colour and yield of onions were improved markedly in muck soil having a pH of 6.9 by the application of 100 lb. manganese sulphate per acre. Applications of Cu, Zn, Fe, and B had, if anything, a depressing effect. In 1951 similar and highly significant yield increases were obtained from soil applications of $MnSO_4$ at 150 and 200 lb. per acre and from a foliar spray at 30 lb. per acre.

3120. CROXALL, H. E., AND HICKMAN, C. J.
The control of onion smut (*Urocystis cepulae*) by seed treatment.
Ann. appl. Biol., 1953, 40: 176-83, bibl. 10.

In field trials near Evesham, good control (twice as many healthy plants as in the untreated plots) of onion smut (*Urocystis cepulae*) was obtained by seed treatment with ferbam and 50% thiram dusts applied with a resin-potash sticker. A pentachloronitrobenzene compound also gave some control of the disease but reduced emergence. Greenhouse trials confirmed these results, but there was a falling off in control at high levels of infection. Chloranil and calomel were relatively ineffective and two organo mercury compounds caused serious seed injury. [From authors' summary.]

3121. CROXALL, H. E., SIDWELL, R. W., AND JENKINS, J. E. E.
White rot (*Sclerotium cepivorum*) of onions in Worcestershire with special reference to control by seed treatment with calomel.
Ann. appl. Biol., 1953, 40: 166-75, bibl. 7.

During 5 seasons good control of white rot (*Sclerotium cepivorum*) of salad onions has been obtained by seed treatment with pure calomel applied with a resin-alcohol sticker. The treatment also gave some control of damping off of seedlings due to *Corticium solani*. Broadcasting 4% calomel dust at 2½-3 cwt. per acre was less satisfactory in controlling white rot. In one season promising results were obtained with seed treatment of bulb onions. The mean number of salad onion plants per yard of drill in 2 tests with pure calomel were: (1) calomel—52 healthy, 2 infected;

control—29 healthy, 11 infected; (2) calomel—60 healthy, 0·3 infected; control—44 healthy, 3·0 infected. The mean numbers of healthy salad onion plants per yard of drill in tests with an equal weight of pure calomel and seed, ¼ weight and ½ weight were 69, 52 and 46 respectively. Costs are high.

3122. BAKKER, M.
Een bladvlekkenziekte van prei, veroorzaakt door *Pleospora herbarum* (Pers.) Rabenh. (A leafspot disease of leek caused by *Pleospora herbarum*.) [English summary 6 lines.]
Tijdschr. PlZiekt., 1953, 59: 25-6, bibl. 7, illus.

A disease of leeks causing a soft rot of the leaves, which later dries so that the leaves wither, may do considerable damage in wet years. Tests carried out in 1951 showed that the disease was caused by the fungus *Pleospora herbarum*. Perithecia appeared about 2 months after inoculation when the humidity was high. Spraying with copper compounds is suggested as a control measure.—Inst. PlZiekt. Onderz., Wageningen.

3123. KAISER, W.
Beitrag zur Bekämpfung der Zwiebelfliege. (Contribution to the control of onion fly.) [English summary 10 lines.]

Z. PflKrankh., 1953, 60: 78-83, bibl. 25.
In trials conducted during 1946-1952 in the onion growing district around Griesheim near Darmstadt, seed treatment gave better control of onion fly, *Hylemyia antiqua*, than did poison baits or sprays. Of the insecticides used, a DDT preparation, Gesarol 50, applied at the rate of 400 g. per 1 kg. seed, was found the most suitable. Calomel, while also effective, was inferior to DDT, and BHC and chlordane damaged the emerging seedlings.

3124. HARRISON, R. A., AND JACKS, H.
Control of onion thrips. I. Preliminary selection of insecticides.
N.Z. J. Sci. Tech., Sect. A, 1952, 34: 335-8, bibl. 1.

Nine insecticides were tested against *Thrips tabaci* on onions in a randomized block experiment in 1951-52. They were employed either singly or in combination of residual and non-residual types and were applied twice at an interval of either 7 or 14 days. The most effective—all per 100 gal. water and at a 7-day interval—were Folidol 1 lb., Hexone 1 pt. plus Nexol 1½ lb., Hexone 1 pt. plus Trimol DDT 2½ lb., Isopestox 1 lb., Trimol DDT 2½ lb.—D.S.I.R., Auckland.

3125. KAPUR, N. S., MATHUR, P. B., AND SINGH, K. K.
Cold storage of onions.
Indian J. Hort., 1953, 10 (1): 9-15, bibl. 7.

An experiment on the storage of onions was conducted at the Central Food Technological Research Institute, Mysore. White onions weighing 5-30 and 30-90 g. were subjected to 4 storage treatments, viz. (1) 32-35° F. and 85-87·5% R.H.; (2) 46-50° F. and 88·5-89·5% R.H.; (3) room temperature (59-87° F.) and 45·0-78·5% R.H.; and (4) room temperature and 1% $KMnO_4$ wash. Because of the high humidity the 2 refrigerated lots began to root and germinate soon after storage. $KMnO_4$ had no effect on keeping quality.

At room temperature there was practically no rooting or germination and this is the method of storage recommended. Percentage sucrose fell from 4.95 to 0.67 during storage at 32-35° F. and to 0.1 at 46-50° F. Percentage reducing sugars fell from 2.6 to 0.96 during storage at 32-35° F. and to 0.09 at 46-50° F. In untreated onions the greater the percentage of rooting and germination, the greater were the losses of sucrose and reducing sugars.

3126. BOYD, J. S., AND DAVIS, J. F.
Mechanical handling and bulk storage of onions.
Quart. Bull. Mich. agric. Exp. Stat., 1953,
 35: 279-87, bibl. 4, illus.

A successful method for the mechanical handling and storage of onions is described. Provided the tops were not removed, no reduction in market quality was found, and very little damage to the bottom layers in storage bins 12 ft. deep occurred when onions were loaded by elevators fitted with canvas shutters. Field treatment with maleic hydrazide to prevent sprouting is mentioned.

Root crops.

(See also 2477, 3196c, s. w.)

3127. WARNE, L. G. G.
Spacing experiments on vegetables. VII. The growth and yield of globe beet, parsnips and carrots grown at several spacings in two adjacent fields of different fertility.
J. hort. Sci., 1953, 28: 114-20, bibl. 9.

Spacing experiments on globe beet, parsnips and carrots were carried out in two adjacent fields differing in their fertility. The three crops responded differently to the different fertility level both in yield and chemical composition of the foliage. To produce maximum total yields of roots, higher populations of carrots and parsnips were necessary in the field of low fertility than in the field of high fertility, but this was not so for yields of "large" (saleable) roots; although, with parsnips and globe beet, fewer plants were permissible in the former field for maximum yields of large roots. No such effect was evident for carrots, within the population ranges tested. Close spacing of the carrots tended to decrease the incidence of splitting. Root weight was equally dependent on the area available for growth in the two fields and no effect of spacing on the contents of nitrogen, lime, potash or phosphate in the foliage of the beet or carrots was found in either field. These observations of the spacing effects in the two fields tended to confirm a previously expressed view that the effects of close spacing in restricting growth cannot be explained solely in terms of competition for light, water or the major nutrient elements. [Author's summary].—Univ. Manchester.

3128. WARNE, L. G. G.
When row width is less important.
Grower, 1953, 39: 675.

Figures based on experiments made in Cheshire are given for the optimum number of beet, parsnip, carrot and onion plants per acre. Variation outside these limits will reduce the yield of saleable roots or bulbs, but within these limits row width appears to be of relatively little importance. Gaps in the rows will be compensated for by better growth of adjacent plants

only where there is normally intense competition between plants of neighbouring rows, hence where numerous gaps are likely to occur close spacing is advisable.—Manchester Univ.

3129. WARNE, L. G. G.
How to detect overcrowding.
Grower, 1953, 39: 783.

It is estimated that a crop is probably overcrowded when the average root or bulb weight is less than 2½ oz. for globe beet, 7 oz. for long beet, 7 oz. for parsnips, 1½ oz. for carrots and 1¾ oz. for onions. The presence of a proportion of small roots is not necessarily a sign of overcrowding because, when the plant stand is dense enough to give maximum yields, about 10% by weight of the crop will be small.—Manchester Univ.

3130. NILSSON, F., AND HINTZE, S.
Sort- och stamförsök med morötter 1948-50. (Carrot trials, 1948-50.) [English summary 1½ pp.]
Medd. Trädgårdsförs., Malmö 75, 1952, pp. 32, bibl. 9.

Trials were conducted with 8 varieties and strains of carrot at 7 localities in Sweden from 1948 to 1950. Each consisted of 4 or 8 blocks randomized in a split-plot design. 5 cm. spacing gave heavier yields than 10 cm. spacing; in 2 southern localities, where unthinned plots were compared with 5 cm. spacing, the former gave the higher yield. In most cases London torg W:s/45 was the best strain, followed by London torg LD/45; Nantes W:s/43 gave the smallest yields. The best keepers were Amager OE/45 and Regulus W:s/44, while Amager Tagenshus III, Nantes OE/48 and Nantes W:s/43 showed the greatest losses. The 2 Nantes strains had the best root quality, having the smallest and reddest core. Amager Tagenshus III had the highest content of both sugar and carotene.

3131. HAWTHORN, L. R.
Interrelations of soil moisture, nitrogen and spacing in carrot seed production.
Proc. Amer. Soc. hort. Sci., 1952, 60: 321-6, bibl. 6.

In a trial in Utah Red Core Chantenay carrots were sown in rows 36, 18 and 9 in. apart. Treatment of the area during the first year was uniform. In the second year 3 levels of soil moisture were maintained and 2 levels of N, 0 and 100 lb. per acre were applied. Seed yields tended to increase with medium and low soil moisture, but spacing had a much greater effect than moisture, yields declining at the spacings below 36 in. Unlike the other treatments N appreciably increased plant height, plant colour and the amount of lodging; it also increased yields, but to too small an extent under the most favourable combination of low soil moisture and wide spacings to justify its use.

3132. YAMAGUCHI, M., ROBINSON, B., AND MACGILLIVRAY, J. H.
Some horticultural aspects of the food value of carrots.
Proc. Amer. Soc. hort. Sci., 1952, 60: 351-8, bibl. 18.

The results are recorded of studies in California on the effects on the food value of carrots of storage in crushed ice for 3 days after harvest, size of root, region of root, age, time of year, locality in which grown, and variety.

The carrots were analysed for energy (calculated from total sugars, starches, fats and proteins), protein, Ca, Fe, P, vitamin A, ascorbic acid, thiamine, riboflavin and niacin.

3133. SAKR, S. M.

Effect of temperature and photoperiod on seed stalk development in parsnip.

Proc. Amer. Soc. hort. Sci., 1952, 60: 299-300, bibl. 2.

At Ithaca, New York, parsnips, sown in October in a greenhouse at 60°-70° F. and a month later and kept at various temperatures ranging from 40° to 80° F. and at normal day-lengths and at 16-hr photoperiods, did not subsequently flower. In a second trial plants raised in November and subjected to temperatures of 40°-50° F. for 35 or 49 days in March all flowered when subsequently planted in the field in May. In field trials in Egypt plants grown from seed sown in September flowered in the spring, whereas with successive later sowings there was progressively less flowering. It is concluded that parsnip plants must reach a certain size before low temperatures will induce seed stalk formation.

3134. STUBBS, L. L.

Further host range and transmission studies with a virus disease of carrot endemic in Australia.

Aust. J. sci. Res., Ser. B, 1952, 5: 399-408, bibl. 5, illus.

The aphid *Cavariella aegopodii* Scopoli transmitted the virus to several non-umbelliferous species, but failed to recover the virus from these species. Heteroplastic grafts between infected petunia and healthy carrot resulted in two infections in the latter species, although graft unions were not recorded. The virus was transmitted to tobacco, but not to carrot, by sap inoculation from infected petunia. Symptoms on all hosts except *Datura stramonium* L. were masked by rising temperatures and intensified by low-temperature conditions. Petunia, tobacco, and *D. stramonium* are regarded as good differential hosts. From these studies it is concluded that the carrot virus is distinct from any previously described. The common name carrot motley dwarf is, therefore, proposed for the virus and the disease. [From author's summary.]

3135. ANON.

Motley dwarf of carrot.

Agric. Gaz. N.S.W., 1952, 63: 653-4, illus.

Notes are given on the motley dwarf virus disease of carrot. Osborne Park shows tolerance; it and selections from it such as West Australian, Champion Long Red and Champion Intermediate produce marketable crops where others fail. Virus incidence can be reduced by sowing from mid-December to late January, when hotter conditions depress the population of the aphid vector, *Cavariella aegopodii*. If sowing occurs at other seasons insecticidal treatment may be necessary. A weekly application of 0.1% DDT spray or a 2% DDT dust is efficacious.

3136. DYE, D. W.

Control of soft-rot (*Erwinia carotovora* (Jones) Holland) in carrots during transit and in storage.

N.Z. J. Sci. Tech., Sect. A, 1953, 34: 465-7.

A highly significant reduction in soft-rot infection of artificially inoculated carrots resulted from post-harvest treatment with bordeaux, Cupro, Copper Sandoz and Perenox at specified strengths, some other fungicides tested being less effective. Exposure of the diseased carrots to bright sunshine also gave good control.—*Plant Dis. Div., D.S.I.R.*, Auckland.

3137. FJELDDALEN, J., AND DAVIKNES, T.

Forsøk med nyere insektmidler mot gulrotflue og gulrotsugre. (Trials with synthetic insecticides against carrot fly and *Trioza apicalis*.)

Gartneryrket, 1953, 43: 163-8.

Experiments with winter carbolineum for the control of the carrot pests *Psila rosae* and *Trioza apicalis* were superseded by trials with synthetic insecticides. Disregarding carbolineum, which is effective but phytotoxic, the best results were obtained with chlordane and parathion. Three to four applications from the middle of June onwards are recommended for the control of carrot fly and 3 applications from the second half of June for *Trioza apicalis*. Spraying should be thorough, at the rate of 200 l. per 1,000 m².

3138. KRICKL, M.

Genügen die derzeitigen Werteigenschaften der Radieschen? (Are we satisfied with our present radish varieties?)

Saatgut-Wirtsch., 1953, 5: 63-4, bibl. 2, illus.

Selection of radishes for absence of woodiness has been carried out at two Austrian vegetable research stations. The method used is described.

3139. HAGIYA, K.

Physiological studies on the occurrence of the "pithy tissue" in root crops. 2. On the varietal difference of the characters concerned with the occurrence of pithy tissue in radish. [Japanese, with English summary 2 p.]

J. hort. Ass. Japan, 1952, 21: 165-73, bibl. 21, illus.

The physiological mechanisms associated with the occurrence of pithy tissue in radish were investigated. Pithy tissue was found to be associated with early rapid root growth, and with large cells, high sugar content, low soluble matter content and growth of conducting tissue in the root. It developed when the top/root ratio decreased, the leaf/root weight ratio was at its minimum and root expansion was least. Its position and form differed with variety and were thought to depend mainly on the distribution of the conducting tissue. Its occurrence was held to be due to rapid root development exceeding the assimilative capacity of the leaves.

Salad crops.

(See also 2475, 2479, 3196z.)

3140. THOMPSON, R. C.

Lettuce varieties and culture.

Fnrs' Bull. U.S. Dep. Agric. 1953, revised 1951, pp. 42, illus. [received 1953].

The commercial lettuce crop in the United States has a larger annual value than any other salad crop. In this bulletin information is provided on types and varieties

grown, factors affecting production, soil requirements, manuring, planting, cultivation, irrigation, harvesting, handling and shipping, together with notes on pests and diseases and their control.

3141. VAN STEEN, J.

Het kweken van slaplanten onder kunstlicht.
(Raising lettuce plants under artificial light.)
Cult. Hand., 1953, 19: 165, illus.

In a small-scale experiment, lettuces of the variety Goudgele Gotte were sown on 8 December and raised under 40-Watt daylight lamps to give a 24-hr photo-period. The seeds germinated earlier and the seedlings developed better than the controls. The economics of the treatment are briefly considered.

3142. AGLIBUT, A. P., GONZALEZ, L. G., AND GARCIA, A. C.

The influence of varying amounts of water on surface-irrigated lettuce fertilized with ammonium sulfate.

Philipp. Agric., 1951, 35: 304-18, bibl. 4, illus.

The effect of different amounts of water on the growth and development of lettuce was studied at the Philippines College of Agriculture in 1950-51. Plants of early curled Simpson were grown on clay loam. Four lots received water equivalent to 10, 20, 30 and 40% of the water-holding capacity (air-dry basis) of the soil and were fertilized with ammonium sulphate. The fifth received 30% watering and no fertilizer. Of the fertilized lots the 20% and 30% watered plants gave higher yields than the 10% and 40% plants but not significantly so, except in one of the 3 plantings. The 30% fertilized lot produced a greater yield of more vigorous and uniform plants than the 30% unfertilized lot.

3143. QUANTZ, L.

Die Mosaikkrankheit des Salats, eine samen-übertragbare Virose. (Mosaic of lettuce, a seed-transmissible virus disease.)
Reprinted from *Saatgut-Wirtsch.*, 1952, p. 279.

Mosaic of lettuce has become established in Germany. The precautions recommended to seed producers are based on research work carried out in Great Britain.

3144. DÉMÉTRIADÈS, S. D.

Le *Ramularia lampsanae* (Desm.) Sacc. sur le *Cichorium intybus*. (*Ramularia lampsanae* on chicory.)

Ann. Inst. phytopath. Benaki, 1950, 4: 48-9, bibl. 5 [received 1953].

In 1943 a serious disease of chicory was observed at the Benaki Phytopathological Institute, Greece. White circular spots appeared on the leaves which became desiccated and produced shot holes. The fungus was identified as *Ramularia lampsanae*, a species not previously recorded in Greece.

3145. SPENCER, D. M., AND GLASSCOCK, H. H.

Crook root of watercress.

Plant Path., 1953, 2: 19-21, bibl. 3, illus.

Crook root or curly root of watercress is due to a fungus presumed to belong to the Plasmodiophorales. It has caused decreasing yields in recent years and affects brown cress more than green cress. Pilot control tests with calomel and metallic Cu gave negative results.—

Nat. Veg. Res. Stat., Wellesbourne, and N.A.A.S., Wye. [See also *H.A.*, 22: 574 and 3879.]

3146. BADGER, H. T.

Marketing charges for head lettuce sold in Cleveland, Ohio, February-June 1950.
Market. Res. Rep., U.S. Dep. Agric. Bur. agric. Econ. 6, 1952, pp. 24.

Marketing margins have been determined for lettuces produced in California and Arizona from f.o.b. shipping point through each step in the marketing process to consumers in Cleveland.

Spinach.

(See also 3196c.)

3147. HYLMÖ, B.

Spenat. (*Spinach*.)

Reprinted from *Svensk Växtförrädl.*, [1952?], pp. 371-81, bibl. 4, illus.

The flowering biology of spinach and the aims of selection are discussed. The production of a late-bolting strain of the variety King of Denmark and of a fast-growing strain of the greenhouse variety Cavallius Giant is reported.

3148. SCHMIDT, H.-H.

Die Keimung frisch geernteter Spinatsamen (*Spinacia oleracea* L.). (The germination of freshly harvested spinach seed.)

Saatgut-Wirtsch., 1953, 5: 15-17, bibl. 8, illus.

Germination tests with freshly harvested spinach seed confirmed that a low temperature (8° C.) is more favourable than higher temperatures (15-17° C. and 18-20° C.). An alternating temperature (16 hours 8° C., 8 hours 20° C.) yielded as good results as a constant low temperature and had the advantage over the latter that the test could be broken off after 21 instead of after 28 days. The data are tabulated. Other experiments showed that a storage period of 10 weeks does not appreciably affect the germination capacity of spinach.—Staatsinst. angew. Bot., Hamburg.

3149. STATENS HUSHOLDNINGSRÅD.

Ernaeringsmaessige og husholdningstekniske undersøgelser af kruspersille, sommer-rødkål og spinat. (Nutritional and other studies of parsley, summer red cabbage and spinach.)

Årbog Gartneri 1952, 1953, pp. 231-6.

Data are given on the composition of parsley and of both early and summer spinach. Methods of assessing quality in red cabbage are briefly described.

Tomatoes, eggplants and capsicums.

(See also 2459, 2470, 2647, 2674, 2848, 3196h, j-l, q, r, u, 3226, 3227, 3230, 3316, 3394, 3663.)

3150. PORTE, W. S.

Commercial production of tomatoes.

Fmrs' Bull. U.S. Dep. Agric. 2045, 1952, pp. 46, illus.

This publication, which supersedes two earlier bulletins, gives recommendations on varieties, raising the plants in various areas, soils, manures and starter solutions, training and pruning, pests and diseases and their control, and harvesting and handling.

3151. ANON.

Cultures maraîchères: tomates. (Market garden crops: tomatoes.)
Rapp. Cons. Exp. Rech. agron. Algér.
 1951/52, 1952, pp. 165-72.

Investigations cover eating tomatoes for export and local consumption and processing crops in Algeria. *Eating tomatoes.* The earliness and yield of 15 winter-crop varieties for export were compared. Promising types for the English market (small fruit less than 75 g.) were the 2 early heavy-yielders P.L. 23 and Early Chatham, and also J.H. 2 and Rivoire; with Early Chatham nursery sowing followed by transplanting into the field and nursery sowing followed by pricking out in the nursery showed advantage over direct sowing in the field, the first increasing yield and the second increasing earliness and financial return. In another experiment with winter-crop varieties 24 recently introduced American and Italian types were tried. Tests of 31 autumn crop varieties are also reported with notes on outstanding qualities. *Processing tomatoes.* When 34 varieties were compared with Marglobe 158, Early Chatham and Canatella 190 exceeded it in yield. In a trial of 9 purée varieties the Italian varieties Prospero, Pilastro and Pancrazio gave the highest yields, followed by Saint-Pierre and Pritchard. Three types of San Marzano, considered the best variety for peeled tomatoes in Italy, were tested in 1949-50-51, and are reported on here.

3152. ANDEWEG, J. M.

Enkele grepen uit de tomatenveredeling.
 (Some aspects of tomato breeding.)
Notulen Studiekring voor PlVered., 1952,
 37: 474-80, from English abstr. in *Euphytica*,
 1953, 2: 87.

Work in Holland on the breeding of disease resistant varieties, the breeding of rootstocks resistant to diseases and nematodes, and the production of F_1 seed is dealt with.

3153. CICIN, N. V., AND NAZAROVA, M. Z.

Trials on vegetative and sexual hybridization of unrelated plants. [Russian.]
Izv. Akad. Nauk S.S.R. Ser. biol., 1953,
 No. 1, pp. 20-35, bibl. 7, illus.

At the Main Botanical Garden of the Academy of Sciences, U.S.S.R., various tomato, *Lycopersicum*, species and varieties grafted on tree tomato, *Cyphomandra betacea*, produced a new form of tomato, which breeds true when self-pollinated, and is called by the author *Lycopersicum cyphomandroforme*. The vegetative hybrids when crossed with tomato varieties resulted in a further new form of plant showing promising characteristics. Increased sugar content, fleshiness and keeping quality and reduced number of seeds are among the improvements observed in the fruits of these vegetative and sexual hybrids.

3154. DENNISON, R. A., HALL, C. B., AND NETTLES, V. F.

Influence of certain factors on tomato quality.
Proc. Fla St. hort. Soc. for 1952, pp. 108-11,
 bibl. 24, being *J. Ser. Fla agric. Exp. Stat.*
 113.

The effects of growing, harvesting, handling and

ripening conditions on the colour, firmness, internal appearance and flavour of green-wrap tomatoes are summarized with reference to the literature.

3155. HUNTER, J. A.

Comparison of growth of tomato plants in impervious plastic pots and porous clay pots.
N.Z. J. Sci. Tech., Sect. A, 1952, 34: 365-8,
 bibl. 6, illus.

Tomato plants grown in impervious plastic pots required less water, produced a greater fresh weight of stem and leaves, and had a more even root distribution than those grown in porous clay pots. The plastic pots remained free from moss and algal growth and were easier to clean.—D.S.I.R., Auckland.

3156. LEARNER, E. N., AND WITWER, S. H.

Comparative effects of low temperature exposure, limited soil moisture, and certain chemical growth regulators as hardening agents for greenhouse grown tomatoes.

Proc. Amer. Soc. hort. Sci., 1952, 60:
 315-20, bibl. 14, being *J. Art. Mich. agric.*
Exp. Stat. 1381.

As a hardening treatment limiting the water supply from 10 days before transplanting was more effective in increasing the sugar content of both tops and roots than were 10-day exposures to night temperatures of 40° F. A combination of 60° F. and low moisture did not give significantly better results than 60° F. and high moisture, but produced significantly better early and total yields than did 40° F. with either low or high moisture. Among 4 growth substances tested as hardening agents 4-phthalimido-2,6-dimethyl pyrimidine applied at 2.5 mg. per plant 10 days before transplanting produced a 12% increase in the total weight of fruit harvested during the first 2 weeks. Maleic hydrazide applied to the soil at 2.5 mg. per plant induced a 45% increase in accumulation of total sugars in the roots and a drastic reduction in fruit yield. A similar application of alpha-ortho-chlorophenoxy propionic acid decreased total sugar in the roots by 67% and number of fruit harvested by 12%.

3157. WATTS, V. M., AND HALL, C. V.

Time of setting and condition of plants influence tomato yields.

Ark. Fm Res., 1953, 2 (1): 1, illus.

Tomato plants started in a glass-covered hot bed, pricked out at 2 x 2 in. spacing and finally transplanted to the field produced slightly over 6 t. of fruit per acre, while those raised in a cloth-covered cold frame and not pricked out prior to setting out yielded just over 4 t. per acre.

3158. BÖHNING, R. H., KENDALL, W. A., AND LINCK, A. J.

Effect of temperature and sucrose on growth and translocation in tomato.

Amer. J. Bot., 1953, 40: 150-3, bibl. 7,
 being *Pap. Dep. Bot. Plant Path. Ohio St.*
Univ. 550.

The effect of concentration of supplied sucrose on growth of tomato stems and leaves has been studied. The blade of one of the lowest leaves on each of a number of tomato plants was immersed in a particular concentration of graded series of sucrose solutions and

subsequent elongation in the dark of the stem and an apical leaf during a 109-hr period was measured. A direct proportionality between stem and leaf elongation and sucrose concentration in the range of 0·0-0·4 M. was observed. The relationship between stem and leaf elongation and concentration of supplied sucrose was used as a basis for investigating the effect of temperature on carbohydrate translocation. In these studies the blade of a basal leaf of each plant was placed in a culture tube containing a 0·4 M. sucrose solution. The temperature of a 2-in. segment of stem or petiole was then varied over a range of 12-30° C. The temperature of all other parts of the plant was maintained at 24° ± 1° C. Subsequent elongation in the dark of the stem and an apical leaf during a 110-hr period was measured. On the basis of differences in elongation occurring among the various temperature treatments, an optimum temperature for carbohydrate transport occurred at approximately 24° C. The temperature coefficient for carbohydrate translocation in the range of 12-24° C. was approximately 1·5. [Authors' summary.]

3159. MAYBERRY, B. D.

Growth and development of vegetable crops as influenced by foliage application of sucrose and major nutrient elements.

From abstr. in *Dissert. Abstr.*, 1952, 12: 774.

It was found that sucrose sprays caused an increase in vegetative growth in tomatoes only when high temperatures (70-80° F.) were combined with short photoperiods (7 hrs or less). The yield of 10 varieties of greenhouse tomato, grown during winter at 60° F. night temperature and a 9-10 hr photoperiod, was not increased by weekly foliar applications of 10% sucrose solutions. Tomato plants which had been sprayed with 10% sucrose solutions and stored for 96 hrs at 50° F. suffered considerably more from the shock of subsequent transplanting than did plants sprayed only with water. The yield of field tomatoes was significantly increased by four foliage applications of 0·6% solutions of urea in the form of Nugreen. Greenhouse celery absorbed and utilized 0·75% solutions of urea when sprayed on the leaves at temperatures ranging from 40° to 70° F., as indicated by total dry weight. Yields were increased significantly in early field celery plants by four foliage sprays of 1·0% urea solution. Applications of similar quantities of urea to the soil proved of little benefit. Radioactive phosphorus (P^{32}) applied to the primary leaves of beans and squash was rapidly absorbed and showed definite accumulation in the root tips and terminal buds within 6 hours after treatment, while radio-potassium (K^{40}) was found to be distributed more evenly over the entire plant. The rate of absorption of P^{32} from the soil by tomato plants decreased as night temperatures were lowered from 75° to 45° F. Under comparable conditions, absorption of P^{32} from the foliage was little affected by temperature variations.—*Mich. St. Coll.*

3160. CALVERT, A.

Temperature and truss size in tomatoes.

Grower, 1953, 39: 524-5.

Preliminary work at the John Innes Horticultural Institution has shown that low temperatures during flower initiation can increase the number of flowers

borne on a tomato inflorescence. Ailsa Craig, for instance, produced 9 flowers on the first truss when the temperature during initiation was 60° F. and 14 flowers when the temperature was 54° F. For practical purposes, when plants are grown at 60° F., lowering the temperature during the second week after pricking out (cotyledon expansion) is likely to increase the number of flowers on the first truss. Whether such treatment is justifiable, in view of the possible detrimental effects on growth and fruit setting, remains to be determined.

3161. BANDURSKI, R. S., AND OTHERS.

The effect of temperature on the color and anatomy of tomato leaves.

Amer. J. Bot., 1953, 40: 41-6, bibl. 9, illus.

Tomato plants grown under varied day and night temperatures, other factors being constant, were found to differ in growth habit, anatomical structure and leaf colour. Darkness of leaf colour increases as the day temperature is increased and decreases as the night temperature increases. In a low day temperature the amounts of carotene, carotenol and chlorophyll pigment synthesized are much reduced. The decreased leaf colour at high night temperatures is due to anatomical change, leaves grown at 4° C. being compact with a minimal cross-sectional area of intercellular space.—*Calif. Inst. Technol. and Univ. Calif.*

3162. HUDSON, J. P., AND SALTER, P. J.

Effects of different water-regimes on the growth of tomatoes under glass.

Nature, 1953, 171: 480-1, bibl. 4.

When 2 varieties of tomato had become well established by 25 April they were subjected thereafter to 4 water-regime treatments. Water was applied when tensiometer bulbs embedded at 15 cm. depth in key plots recorded 7, 15, 30 and 60 cm. of mercury, the quantity of water applied being in each case approximately that needed to wet the beds to field capacity. The results showed strong positive correlations between the rate of watering and yield of ripe fruit and vigour of growth. The zone of greatest root development became progressively deeper in the drier treatments. [See also *H.A.*, 23:1947.]

3163. ANON.

Using raised beds to maintain tomato yields.

Grower, 1953, 39: 737-41, illus.

The results are reported of 4 years' experience at Fernhurst Horticultural Research Station on growing glasshouse tomatoes in concrete beds containing 6 inches of John Innes compost. The compost can be easily changed every few years to avoid soil sickness. Plants in John Innes Compost (J.I.P.) 1 gave higher yields than those in J.I.P. 2 or 3, which showed signs of damage from high salt concentration. With J.I.P. 1 yield increases of 1½-2 lb. per plant were obtained compared with plants in border soil. The economics of production by this method are discussed.

3164. MOORE, E. L., AND THOMAS, W. O.

Some effects of shading and para-chlorophenoxy acetic acid on fruitfulness of tomatoes.

Proc. Amer. Soc. hort. Sci., 1952, 60: 289-94, bibl. 16, being *J. Art. Miss. agric. Exp. Stat.* 281.

Stokesdale tomatoes, after transplanting to the field, were grown under 3 light intensities: high (full sunlight, about 7,725 f.c.), medium (shaded to produce an average of 3,440 f.c.), and low (shaded to produce an average of 2,132 f.c.). On half the plants the first 3 flower clusters were sprayed individually with 25 p.p.m. PCA. The light intensities used had no effect on the date of appearance of the first or second clusters, nor on the date of the first harvest, but greater plant growth occurred under low and medium intensities. PCA reduced the time from flowering to first harvest by 9 days, irrespective of light intensity. The early yield of tomatoes was trebled under the medium light intensity and also by PCA, and the combined effects of these treatments was even more pronounced. The individual treatments had less effect on total yield and on size of fruit, but medium light intensity and PCA combined significantly increased total yield and fruit size over the controls. The increases in early yields from treatments occurred under temperatures known to be above the optimum for fruit set, although air temperatures were little affected by shading. Possible explanations of this response are discussed.

3165. PIQUER, G., AND TILKIN, N.

Les possibilités d'emploi de l'éclairage artificiel en horticulture. (The possibilities of using artificial light in horticulture.)

Bull. hort. Liège, 1952, 8: 140-6, bibl. 15, illus.

This paper includes a detailed description of the raising of a crop of Vetomold 121 tomatoes under 450-watt Philips HO 2000 lamps. The lamps were hung 70 cm. above the soil, one every 1.5 sq. m., and light was provided for 6-7 hours daily. Sowings took place on 14 December and harvesting began on 22 May.

3166. MCGUIRE, D. C.

Storage of tomato pollen.

Proc. Amer. Soc. hort. Sci., 1952, 60: 419-24, bibl. 9.

Pollen of the tomato variety San Marzano remained viable longer when stored at 0° C. and in low humidity over CaCl_2 than pollen stored at 10° and 20° C. and at higher humidities (room conditions). Although fruits were produced by 1-year-old pollen, they were seedless, and the practical limit for storage under good conditions seems to be about 6 months.

3167. SINGH, S. M., AND KACKER, P. N.

Effects of some hormones and their methods of application on parthenocarpy in tomato fruits.

Indian J. Hort., 1952, 9 (4): 25-9, bibl. 14, illus.

An experiment was conducted at Agra in 1949-50 to determine the effect of hormone treatment on seedlessness and size in tomato fruits. Indolebutyric acid, indoleacetic acid and naphthaleneacetic acid were applied in lanolin paste (0.5% concentration) to the flowers and by injection of the dry chemical (0.02 g. per plant) at the base of the plant. The three hormones did not differ significantly in their effects. Paste treatment yielded completely seedless fruits while injection produced fruits with an average of 11.6 seeds per fruit compared with 28.5 in the controls. The diameter, weight and volume of the parthenocarpic fruits were

considerably smaller than in the controls, viz. paste: 3.59 cm., 27.4 g., and 25.1 c.c.; injection: 4.52 cm., 41.1 g., and 41.2 c.c.; control: 4.9 cm., 45.1 g., and 43.4 c.c.

3168. KRAUS, G.

Sicherung der Tomatenreife auf chemischem Wege. (Chemical means of ensuring a good tomato crop.) [English summary 5 lines.] *Mitt. Klosterneuburg*, 1953, 3: 74-83, bibl. 9, illus.

The English hormone preparation Tomato-Set was tested on outdoor tomatoes at Vienna-Schönbrunn. The data of one year's trials show both an earlier and a larger crop as a result of the treatment. Morphological observations and data on the composition of sprayed, emasculated and untreated fruits are also recorded.

3169. HONG, H. L., AND VERKERK, K.

Vergelijking van verschillende methoden van kunstmatige bestuiving bij tomaten. (Comparison of different methods of artificial pollination of tomatoes.) [English summary ½ p.]

Meded. Dir. Tuinb., 1953, 16: 229-38, bibl. 3, being *Publ. Lab. Tuinb. Plt.*, Wageningen 111.

A comparison was made of the effect on yield of Ailsa Craig and Tuckqueen tomatoes of artificial pollination with the electric "buzzer" [see *H.A.*, 16: 926 and 18: 2082] and by the traditional method of shaking the wires in dull weather or spraying with water in bright weather. Results are tabulated for total yields, mean weight of fruit, quality of fruit and earliness. The financial return as a result of "buzzing" was 20% higher in Ailsa Craig. In Tuckqueen the higher yield only just covered the extra cost of labour for "buzzing". The use of the traditional method in combination with "buzzing" resulted in no higher yields than "buzzing" alone.

3170. PAISLEY, K.

Fertilizers for horticultural crops. 13. Manures for tomatoes under glass.

Fert. Feed. St. J., 1953, 39: 209-13.

Current methods of manuring tomatoes under glass are reviewed under the following headings: the propagation stage, base manures, liming, top dressings, Mg deficiency and mineral excesses.

3171. MOSE, P., AND OTHERS.

Forsøg med kali, kvaestof og magnesium til tomater. (Experiments on potassium, nitrogen and magnesium manuring of tomatoes.) *Årbog Gartneri* 1952, 1953, pp. 126-36.

In these trials on tomato manuring, carried out by several growers and a horticultural school, no benefit was derived from Mg, but the importance of a balance between K and N was emphasized. The best results, especially in respect of quality, were obtained from a basic application of K followed by N applications 8 weeks after planting and thereafter at fortnightly intervals. Detailed data are tabulated.

3172. AHMED, M. B., AND TWYMAN, E. S.

Manganese requirements of tomato plants at different phases of growth.

Nature, 1953, 171: 438-9, bibl. 3.

In experiments at Birmingham University the water

culture technique was employed and Mn was supplied as Mn oxide at 0.5 p.p.m. Mn. In the first experiment, after a two-week germination period without Mn, the seedlings were subjected to 8 8-week treatments in which Mn was supplied and withheld at various stages. The data presented indicate that for normal development from germination to the formation of young fruits at the first truss Mn must be available for at least 4 weeks after the initial 2 weeks' growth without it. In a second experiment, 4 different treatments were applied in which Mn was given during the first 2 weeks' growth and for 6 weeks thereafter, during the 3rd and 4th weeks after the initial fortnight, during the 3rd week only and during the 4th week only. All plants were normal, with no significant differences in dry weights and with adequate average Mn contents of the tops.

3173. MONTELARO, J., HALL, C. B., AND JAMISON, F. S.

Reduction of urea injury to tomato foliage by addition of magnesium sulfate to the spray solution.

Proc. Amer. Soc. hort. Sci., 1952, 60: 286-8, bibl. 6, illus., being *J. Ser. Fla agric. Exp. Stat.* 67.

Among 9 materials tested only sucrose and $MgSO_4$, when added to urea solutions, produced a marked reduction in foliar injury caused by urea sprays.

3174. CICCARONE, A.

Danni da irrigazione al pomodoro. (Irrigation injury in tomatoes.) [English summary 5 lines.]

Boll. Staz. Pat. veg. Roma, 1951 (issued 1953), 9: 159-62, illus.

If too much water is supplied, irrigated tomatoes on heavy soils are liable to withering, reduced yield and, in extreme cases, death through the rotting of the root cortex a few cm. below ground. It is advisable to avoid: excessive watering except on light volcanic soils; slopes whose gradient does not permit proper control of water movement; and long channels part of which remains long submerged. Regular weeding from transplanting onwards is beneficial.

3175. BREAZEALE, E. L., AND MCGEOGE, W. T.

Exudation pressure in roots of tomato plants under humid conditions.

Soil Sci., 1953, 75: 293-8, bibl. 7, illus.

These experiments [on tomato plants] present further evidence that intake of water may be a major function of the leaves under conditions of high humidity. When the normal diffusion-pressure deficit gradient is reversed by subjecting the aerial part of the plant to a highly humid atmosphere, exudation or "negative" root pressure can be demonstrated and measured. This may be done either by measuring the volume of water exuded by the roots or by measuring the pressure exhibited when the roots are sealed in a flask to which a manometer is attached. [Authors' summary.]—The simple apparatus used for measuring root exudation pressure is described and illustrated. For earlier work see *H.A.*, 20: 2864 and 22: 33.]

3176. HAINES, F. M.

The absorption of water by leaves in fogged air.

J. exp. Bot., 1953, 4: 106-7, bibl. 2.

Results of laboratory experiments with tomatoes showed that although leaves were capable of absorbing water for their own turgor from fogged air, water was not forced into the stem by any increased hydrostatic pressure.—Queen Mary College, Univ. London.

3177. KRUŽILIN, A. S.

How to control wilting and stolbur disease of plants. [Russian.]

Sad i Ogorod, 1953, No. 2, pp. 63-7, bibl. 4.

In the hot, arid regions of southern Russia, fusarium wilt and stolbur [big bud virus] disease are among the major diseases of the Solanaceae, particularly tomatoes. A brief review of literature shows that, to prevent both diseases, seeds should be sown early in the season, preferably *in situ*, adequate irrigation, especially during the establishment of the plants, being provided. Shading and mulching are advisable. The soil should be well aerated and supplied with nutrients and in these areas only varieties resistant to high temperatures should be grown.

3178. DYE, D. W.

Control of bacterial canker of tomatoes (*Corynebacterium michiganense* (Erw. Smith) Jensen).

N.Z. J. Sci. Tech., Sect. A, 1952, 34: 339-40, bibl. 1.

In the 1951-52 season dwarf tomato plants infected with bacterial canker (*Corynebacterium michiganense*) were sprayed with bordeaux mixture, cuprox, perenox, ascospay and phygon XL. Phygon XL at 1 lb. per gal. water markedly reduced infection (5.3% fruit infected compared with 15.6% in the controls) and had no adverse effect on yield. All other materials were ineffective.

3179. GÄUMANN, E., AND NAEF-ROTH, S.

Über einen mutmasslichen Desensibilisierungseffekt bei einem Welketoxin. (On a probable desensitizing effect of a wilting toxin.)

Phytopath. Z., 1953, 20: 133-66, bibl. 6.

The sensitivity of tomato shoots to lycomarasmin, a wilting toxin of *Fusarium lycopersici*, was found to vary with the time at which the toxin begins to act after cutting. When cut the shoot was found to undergo a traumatic sensitization towards lycomarasmin. If, however, a cut shoot was treated twice—(1) after cutting and (2) 24 hours later—the response to the second application was weaker than it would have been without pre-treatment. For this phenomenon the authors coined the term desensitizing effect (Desensibilisierungseffekt). This effect was shown to occur only if the first treatment exceeded a certain threshold value; below that value desensitization of the host did not occur, but the injurious effects of the two toxin applications were additive in the usual manner. In the case of the lycomarasmin-iron complex the threshold value for the first application was determined as 10-40 mg./kg. fresh weight, according to season. When the threshold value was exceeded, the desensitizing effect appeared to increase with dosage. The nature and significance

of the mechanism of the phenomenon are discussed.—Eidg. Technische Hochschule, Zürich.

3180. DIMOND, A. E., AND DAVIS, D.

The chemotherapeutic activity of benzothiazole and related compounds for fusarium wilt of tomato.

Phytopathology, 1953, 43: 43-4, bibl. 8.

The potassium and sodium salts of 2-benzothiazolylthioglycolic acid are very low in fungitoxicity but rather high in chemotherapeutic potency. The evidence indicates that these compounds are not accumulated in the plant to a sufficient degree to account for their chemotherapeutic potency as systemic fungicides. The chemotherapeutic potency of a number of compounds related to potassium 2-benzothiazolylthioglycolate varies markedly, thiazole and mercaptobenzothiazole having no activity, benzothiazole and potassium α -(2-benzothiazolyl) thiopropionate being moderately active, and sodium and potassium 2-benzothiazolylthioglycolates being highly active. Activity of these compounds as chemotherapeutics is directly related to their formative activity upon plants, and the analogy between them and the phenoxy acids is stressed. [Authors' summary.]

3181. ORILLO, F. T.

An undescribed species of *Melanconium* on tomato in the Philippines.

Philipp. Agric., 1951, 35: 338-9, bibl. 2 [received 1953].

The symptoms are described of a tomato fruit rot caused by an undescribed species of *Melanconium* tentatively named *M. lycopersici*. The disease was first observed at the College of Agriculture, Laguna, in 1951.

3182. VIADO, G. B., AND ESTIOKO, R. R.

Tests of five insecticidal dusts in the control of insects affecting tomatoes and eggplants.

Philipp. Agric., 1951, 35: 343-57, bibl. 34 [received 1953].

Five Du Pont insecticidal dusts were tested against a number of pests of tomato and eggplant in a field experiment: deenate 10-X (10% DDT), alorco cryolite (90% Na fluoaluminate), marlate 50 (50% methoxy-chlor), lexone 50 (50% BHC containing 10% gamma isomer), and Du Pont Ca arsenate. All were employed diluted to 10% concentration with kaolin. Lexone burned the leaves, flowers and stems of both species, especially eggplant. On tomato deenate gave the best control of *Heliothis armigera* and of the larvae and adults of *Epilachna philippinensis*; it also gave the greatest increase in number of fruits per plant (4.5 increase) in weight per fruit (4.5 g.) and in total weight per plant (206 g.). On eggplant lexone gave the best control of *Psylliodes balyi* and *P. splendida*, *Empoasca flavesens* and aphids, but deenate of *Epilachna*.

3183. LAMB, K. P., AND JACKS, H.

Screening trials of acaricides for control of tomato russet mite (*Phyllocoptes lycopersici* Massee) in the glasshouse.

N.Z. J. Sci. Tech., Sect. A, 1952, 34: 327-34, bibl. 1.

Acaricide trials were carried out under glasshouse conditions on tomato plants infested with *Vasates*

destructor (syn. *Phyllocoptes lycopersici*). Contact effect was assessed from survival rates 24 hours after treatment. Good control was obtained with micronized sulphur dust at 2.5 and 5.0 g. per plant and with the following sprays: 0.2% arathane, 0.1% EPN-300, 0.1% aldrin, 1% midol T.10, 1% midol 100 plus oil, 1% midol 100, 0.1% fololid, 0.17% nicotine sulphate, 0.15% aramite, 1% summer oil, and 0.05% and 0.1% pestox. Sprays of 0.025% and 0.1% higham, 0.1% dieldrin and 0.1% marlate were of doubtful efficacy. Sprays of 0.1% DDT emul., 0.1% neotran and 0.1% PPC did not reduce the population on treated plants significantly below that on the controls.—D.S.I.R., Auckland.

3184. TROMBLY, H. H., AND PORTER, J. W.

Additional carotenes and a colorless polyene of *Lycopersicon* species and strains.

Arch. Biochem. Biophys., 1953, 43: 443-57, bibl. 12, being *J. Pap. Purdue Univ. agric. Exp. Stat.* 645.

Three additional all-trans-carotenes, pigments A and C, and "tetrahydrolycopen", one cis-isomer, pigment B, and a colourless polyene A have been isolated from fruit of tomatoes bred and selected for a high content of carotenes and colourless polyenes other than β -carotene and lycopene. Light-absorption curves, isomerization data, and relative adsorptive properties have been presented for each of these compounds. The compound "unidentified I" has been identified as "protetrahydrolycopen". [From authors' summary. For earlier papers see *Ibidem*, 1946, 10: 537 and 547, and 1950, 27: 390 (*H.A.*, 20: 2198).]

3185. WILSON, J. L.

Costs of production. 300 hours for two tons of tomatoes. II Tomato plants at twopence. *Grower*, 1953, 39: 535, 585.

The costs of production of a tomato crop on a small glasshouse holding in Perthshire are analysed. For 4,000 sq. ft. of heated glass the tangible expenses, exclusive of overheads, were £157 and the returns £340. Labour expenditure is analysed in detail.

3186. GUNN, J. T., AND OTHERS.

Conveyor belt tests for harvesting cannery tomatoes—1952.

Veg. Crops Ser. Univ. Calif. 56, 1953, pp. 27, bibl. 6, illus.

In addition to the possibility of saving labour the advantages of conveyor belts for picking tomatoes include the easy removal of culs, reduction of labour fatigue, reduction of box breakage and reduction of box requirement per acre. The disadvantages of this method of harvesting are also discussed.

3187. NICHOLAS, J. E.

Freezing of tomatoes and tomato juice.

Science for the Farmer, being Suppl. 65th A.R. Pa agric. Exp. Stat. 1, Dec. 1952, pp. 7-8, illus.

Tomatoes can now be preserved by freezing either whole, sliced, cubed or as juice. The technique is described. The first picking of ripe tomatoes, particularly hothouse tomatoes, gives the best frozen product. Marglobe and Rutgers have proved satisfactory.

3188. NITSCH, J. P.

Action du jus de tomate sur la croissance des tissus de crown-gall cultivés *in vitro*. (The effect of tomato juice on crown gall tissues grown *in vitro*.)

Ann. agron. Sér. A, 1952, 3: 533-4.

The growth of sterile crown gall tissue of tobacco treated with tomato juice was 400% of that of the untreated control, and of crown gall tissues of *Opuntia* 1,000%.—Versailles Plant Physiology Laboratory.

3189. SAREJANNI, J. A.

Le *Phytophthora* des aubergines en Grèce. (The *Phytophthora* disease of eggplants in Greece.)

Ann. Inst. phytopath. Benaki, 1952, 6: 14-18, bibl. 3.

A fungus identified as *Phytophthora parasitica* Dastur var. *macrospora* Ashby causes serious damage to eggplants grown in the open in Greece. It may attack plants either in the seedbed or the field. In the field it may infect either the lower leaves, the fruit or the neck of the plants, this last type of infection being the most serious as it causes the whole plant to wilt. The symptoms are described. There are 3 possible sources of infection: the seedbed, the irrigation water, or the soil in the field. The following preventive measures are recommended: (1) Do not use any plants from an infected seedbed. (2) When there is infection in the district, treat the seedbed with 2 applications of 0.5% copper sulphate. (3) Remove infected plants from the field as soon as symptoms appear. (4) Disinfect the irrigation water by putting a bag containing copper sulphate in the main channel. Two disinfections with an 8-10 days' interval are usually sufficient. (5) In infected fields solanaceous crops should not be grown more often than every 3 years.

3190. BOSWELL, V. R., DOOLITTLE, S. P., AND PULTZ, E. M.

Pepper production, disease and insect control. *Fmr's Bull. U.S. Dep. Agric.* 2051, 1952, pp. 30, illus.

Peppers (*Capsicum*) can be grown in any soil suitable for other vegetables. Their culture is similar to that of tomatoes; the plants, however, require somewhat more careful handling and rather warmer weather. The fruits of varieties described, both mild and hot, vary from 2 to 9 in. in length.

3191. ANON.

Una nueva variedad de chile dulce. (A new variety of sweet pepper.)

Rev. Agric., Costa Rica, 1952, 24: 293.

The new variety of capsicum, Milfruto, raised at the Interamerican Institute of Agricultural Sciences, Turrialba, is described. It produces numerous medium-sized fruits, significantly more than California Wonder, the best introduced variety. It is particularly well suited to tropical conditions.

3192. SAKR, S. M., AND MAHMOUD, E. E-D.

Viability of seeds harvested from fruits at different stages of maturity.

Proc. Amer. Soc. hort. Sci., 1952, 60: 327-9.

In trials in Egypt maximum percentages of viable seed

were obtained from 3 pepper varieties at the time the fruits started to colour, from 2 watermelon varieties 35 and 23 days after anthesis respectively, and from 2 cantaloupe varieties 27 and 10 days after full bloom, respectively.

3193. PETRÓCZI, I.

A fűszerpaprika termésének a természetes száradás alatt történő kifakulása. (The discoloration of red peppers during air drying.) [English and Russian summaries 1 p. each.]

Növényterm., 1952, 1: 189-200, bibl. 7, illus.

During air drying red peppers are liable to infection by a number of fungi, in consequence of which the strings of fruits become "spotty". The types of discoloration visible on the outside and the characteristic mycelia found inside damaged fruits are classified into 6 groups. The pathogens of the respective groups are *Mucor mucedo*, *M. piriforme* and *Rhizopus nigricans*; *Fusarium* spp.; *Alternaria tenuis*; *Botrytis cinerea*; *Penicillium crustaceum*; *Colletotrichum* spp. The diseases were found to be transmitted by wound infection only, hence more careful handling at harvest and during drying is recommended. Artificial drying gave promising results, but has certain disadvantages. Trials on chemical control are in progress.

Sundry crops.

3194. BALDINI, E.

Ricerche sulla biologia fiorale del cardo. (Research on the floral biology of the cardoon.) [English summary 6 lines.]

Riv. Ortoflorofruttic. Ital., 1953, 37: 10-19, bibl. 20, illus.

The floral biology and the mechanism of anthesis of the cardoon, *Cynara cardunculus* var. *altilis*, ordinarily prevent self-pollination. Cross fertilization by insects is often responsible for the degradation of varieties. Mass selection, the method at present employed by growers, is not satisfactory for a heterogamous plant. Controlled breeding is necessary.—Ist. Colt. arbor. Univ. Firenze.

3195. CICCARONE, A.

La "nebbia" del carciofo (*Cynara scolymus* L.) e del cardo (*Cynara cardunculus* L.). (The powdery mildew of the globe artichoke, *Cynara scolymus*, and the cardoon, *C. cardunculus*.) [English summary 1 1/2 pp.] *Boll. Staz. Pat. veg. Roma*, 1951 (issued 1953), 9: 163-204, bibl. 70, illus.

A description is given of the powdery mildew of the globe artichoke and the cardoon, and of the causative fungus, *Oidium cynarae*, which appears to be specific to these 2 vegetables. Control measures are (1) delaying development as far as the climate permits so that the plants come into production when the temperatures are low; (2) ensuring that the plants have 2 months' dormancy during which they are kept cut back to ground level; (3) spraying with wettable sulphur up to late October and from then on with thiram (*Tulisan* at 0.5%) or salicylanilide (*Shirlan A.G.* at 1%).

Noted.

3196.

a ANON.
The gardener's handbook.
Publ. Dep. Agric., Ottawa, 877, 1952, pp. 15, illus.
Vegetables including potatoes.

b ANON.
Sortsforsøg med lave, grønne bønner. 1949-51. (Variety trials with dwarf beans. 1949-51.)
Tidsskr. Planteavl., 1953, 56: 357-9, being *Medd. Stat. Forsøgvirks. Plantekult.* 489.

c ANON.
Gødningsforsøg med frøavlskulturer af radis og spinat 1948-50. (Manurial trials with radish and spinach grown for seed, 1948-50.)
Tidsskr. Planteavl., 1953, 56: 339-41, being *Medd. Stat. Forsøgvirks. Plantekult.* 484.

d BANGA, O., AND OTHERS.
5° beschrijvende rassenlijst voor groentegewassen (inclusief vroege aardappel, aardbei, tabak, geneeskrachtige en aromatische kruiden) 1953. (5th descriptive variety list of vegetable crops (including early potatoes, strawberries, tobacco, medicinal and aromatic herbs) 1953.)
[*Publ. Inst. Vered. Tuinbougew.*, Wageningen, 1953, pp. 180, fl. 1.75.]

e BOYCE, H. R., AND MCKEEN, C. D.
Greenhouse crops. How fungicides and insecticides keep them healthy.
Agric. Inst. Rev., 1953, 8 (2): 36-8, illus., being *Contr. Div. Ent.* 3045 and *Div. Bot. Plant Path.* 1230, *Sci. Serv., Dep. Agric., Ottawa*.

f BREMER, H.
Der falsche Mehltau des Kohls (*Peronospora brassicae* Gäumann). (Downy mildew of cabbage.)
Z. PflKrankh., 1953, 60: 126-7, bibl. 20.
A brief review of literature, mainly English.

g BROOKE, D. L.
Trends in costs and returns.
Proc. Fla St. hort. Soc. for 1952, pp. 121-4, bibl. 3.
Of vegetable crops in Florida.

h CRAM, W. H.
Hybrid vigor of the Redskin tomato in reciprocal crosses.
Proc. Amer. Soc. hort. Sci., 1952, 60: 415-18, bibl. 13.

i CUMBER, R. A.
The establishment in New Zealand of *Microphanurus basalis* Woll. (Scelionidae: Hym.), egg-parasite of the green vegetable bug, *Nezara viridula* L. (Pentatomidae).
N.Z. J. Sci. Tech., Sect. B, 1953, 34: 267-9, bibl. 2.

j GILBERT, J. C., AND MCGUIRE, D. C.
Root knot resistance in commercial type tomatoes in Hawaii.
Proc. Amer. Soc. hort. Sci., 1952, 60: 401-11, bibl. 8, illus., being *Tech. Pap. Hawaii agric. Exp. Stat.* 262.

k GUBA, E. F.
Red forcing tomatoes resistant and immune to *Cladosporium fulvum* Cke.
From abstr. in *Phytopathology*, 1953, 43: 109.
Improved Bay State and Waltham Mold-Proof Forcing.

l HAMSON, A. R.
Measuring firmness of tomatoes in a breeding program.
Proc. Amer. Soc. hort. Sci., 1952, 60: 425-33, bibl. 14, illus., being *Pap. Dep. Veg. Crops Cornell Univ.* 357.
Including an illustrated description of the pressure tester used.

m HANNA, G. C.
Some observations on the vegetable industry in Australia.
J. Aust. Inst. agric. Sci., 1953, 19: 19-27.

n HARTMAIR, V.
Ergebnisse der Gemüsesortenversuche des Jahres 1951. (Results of vegetable variety trials in 1951.)
Versuchsergebn. Bundesanst. alpine Landw. Admont, Hft. 18, 1952, pp. 36.
For the organization of these trials see *H.A.*, 20: 2716.

o HAYSLIP, N. C., ALLEN, R. J., AND DARBY, J. F.
A vegetable-pasture rotation study at the Indian River field laboratory.
Proc. Fla St. hort. Soc. for 1952, pp. 148-53, illus., being *J. Ser. Fla agric. Exp. Stat.* 120.

p HOOVER, M. W.
The importance of stage of maturity upon the edible quality of green beans, lima beans and southern peas.
Proc. Fla St. hort. Soc. for 1952, pp. 133-7, bibl. 9.

q HORNUM FORSØGSSTATION.
Orienterende undersøgelser over tomatplanteres kvalstofbehov. (Preliminary trials on the nitrogen requirements of tomatoes.)
Årbog Gartneri 1952, 1953, pp. 139-41.

r VAN DER KLOES, L. J. J.
De bemesting van tomaten. (Manuring of tomatoes.) [English summary 1 p.]
Meded. Dir. Tuinb., 1953, 16: 151-68, illus.
For an account in English see *H.A.*, 23: 820.

s MINISTRY OF AGRICULTURE, LONDON.
Flea beetles.
Adv. Leafl. Minist. Agric. Lond. 109, revised 1952, pp. 4, illus.
Phyllotreta spp. on brassicas and *Chaetocnema concinna* on beets and mangolds.

t MULLER, A. S.
A foliar disease of legumes in Central America.
FAO Plant Prot. Bull., 1953, 1: 83-4, bibl. 7.
Chaetoseptoria wellmanii on *Phaseolus* and *Vigna* spp.

u NATTI, J. J.
Symptoms produced on tomato by potato leafroll virus.
From abstr. in *Phytopathology*, 1953, 43: 109.

v NETTLES, V. F.
Promising commercial vegetable varieties for Florida.
Proc. Fla St. hort. Soc. for 1952, pp. 130-3, being *J. Ser. Fla agric. Exp. Stat.* 100.
Includes also strawberries.

w OLESEN, O. J.
Improved carrot varieties.
Fmg S. Afr., 1953, 28: 54.
Cape Market and Chantenay.

x OTTOSSON, L., AND SIMONSSON, B.
Spenatodling med mekaniserad skörd.
(Mechanical harvesting of spinach.)
Reprinted from *Maskintekn. Jord Skog*, 1952, pp. 3, illus.
Machines described and illustrated.

y PENNSYLVANIA STATE COLLEGE.
Pennvalley Late cabbage being bred especially for yellows resistance.
Science for the Farmer, being *Suppl. 65th A.R. Pa agric. Exp. Stat.* 1, Dec. 1952, p. 4, illus.

z POOLE, C. F.
Lettuce improvement in Hawaii.
Proc. Amer. Soc. hort. Sci., 1952, 60: 397-400, being *Tech. Pap. Hawaii agric. Exp. Stat.* 258.
With special reference to the new variety Kaala.

3197.

a ROBB, O. J.
Rhubarb.
Circ. Vineland hort. Exp. Stat. 120, 1952, pp. 5.

b SIDDAPPA, G. S., AND BHATIA, B. S.
Nutritive value of banegara fruit (*Randia dumetorum* Lam.).
Bull. centr. Food tech. Res. Inst. Mysore, 1952, 2 (1): 16.
For use as a cooked vegetable.

c SMITH, I. D. W.
Cabbage, cauliflower, broccoli and brussels sprouts.
Circ. Vineland hort. Exp. Stat. 117, 1952, pp. 7.

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Möglichkeiten der Verhütung von Lagerungsverlusten der Zwiebel auf züchterischen Wege. (The prevention of storage losses in onions by selection.)
Reprinted from *Dtsch. Landw.*, 1952, Hft. 9, pp. 2½.
For a more detailed account see *H.A.*, 23: 1903.

e STONER, W. N.
Greenhouse tests of the resistance of Ohio MR 17 and Niagara cucumbers to the southern strain of cucumber mosaic virus.
Proc. Fla St. hort. Soc. for 1952, pp. 165-9, bibl. 11, illus.
Proved neither resistant nor tolerant.

f U.S. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.
Control of mole crickets.
Leafl. U.S. Dep. Agric. 237, revised 1953, pp. 8, illus., 5 c.
Three *Scapteriscus* spp. and *Gryllotalpa hexadactyla*.

g U.S. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE.
Land slugs, and snails and their control.
Fmrs' Bull. U.S. Dep. Agric. 1895, revised 1953, pp. 8, illus., 5 c.

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The cold storage of vegetable seed and its significance for plant breeding and the seed trade.
Agric. hort. Genet., 1952, 10: 97-104, bibl. 12.
For the summary of the paper, presented at the 13th International Horticultural Congress, see *H.A.*, 23: 679.

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On the tillering in the genus *Allium*. I. On the mechanism of the first tillering of Welsh onion. [Japanese.]
J. hort. Ass. Japan, 1953, 21: 236-40, bibl. 5, illus.

TOBACCO.

General.

(See also 3196d, 3509, 3652, 3657, 3669, 3681.)

3198. PATČE, L.

An economic and geographic review of tobacco production in the world and Yugoslavia. [Serbian, with French summary 4 pp.] *Annu. Fac. Agron. Sylvic. Skopje, Agron. 1948/49*, 1951, 2: 1-55 [received 1953].

Tobacco production in both its agricultural and climatological aspects is reviewed with special attention to tobacco cultivation in Macedonia and other Balkan countries.

3199. I.N.E.A.C.

Comptes rendus de recherche. La culture du tabac à Kaniama. (Research report. Tobacco growing in Kaniama.)

Bull. Inf. I.N.E.A.C., 1953, 2: 67-76.

Notes are given on research on flue-cured, White Burley, Maryland and cigar varieties conducted at the Kaniama station in Haut-Lomami, Belgian Congo, in 1950-51 and 1951-52 (annual rainfall in 1950 and 1951 1,700-1,775 mm. with a 4-month dry season). *Variety trials*. The most suitable varieties of each of the different types are listed and the results of yield trials noted. *Susceptibility to leaf necrosis* (*Cercospora* sp.). In general, burley tobaccos were the most susceptible, flue-cured moderately susceptible, and cigar wrapper types resistant. *Fertilizer trials* on Sumatra Cobelkat are reported. *Rotational experiments*. Yields were lower in a 5-crop than in a 3-crop rotation and were not affected by a previous leguminous crop. Notes are also given on bush clearance, nursery shading and varietal character maintenance tests.

3200. ANDERSON, P. J.

Growing tobacco in Connecticut.

Bull. Conn. agric. Exp. Stat. 564, 1953, pp. 110, illus.

This bulletin replaces *Bull. 364*, Tobacco Culture in Connecticut. It covers all aspects from the seedbed to the curing shed and sorting shop, including the control of diseases and pests. Three varieties are grown in Connecticut. Broadleaf (U.S. Type 51) and Havana Seed (U.S. 52) are cigar-binder tobaccos, are sun-grown and give average yields of 1,600 lb. per acre. Shade (U.S. 61), which is identical with the variety grown generally in Cuba today, is a cigar-wrapper tobacco, is grown under cotton cloth shades, and gives an average yield of 960 lb. per acre.

3201. HAVILAND, W. E.

The tobacco industry of Southern Rhodesia.

An economic analysis. Part I. Economic history and its lessons.

Rhod. agric. J., 1952, 49: 365-81, bibl. extensive.

This analysis of the industry covers the following periods and aspects: A. Tobacco in the economy up to 1910—The period of experiment. B. The period of unstable extensive expansion, 1910-36. C. The Tobacco Marketing Act of 1936, production control and auctions. D. The period of stable expansion since

1936. E. Long-run changes in the pattern of trade. F. Commentary on research.

3202. MOLINARI, E.

Der Tabakanbau in der Schweiz. (Tobacco growing in Switzerland.)

Fachl. Mitt. Österreich. Tabakregie, 1951, Hft 1, pp. 19-22, illus. [received 1953].

About 1,200 ha. were under tobacco in 1948, mainly in the valley of the river Broye, in the Ticino valleys and in the region of Lake Constance and the Rhine valley. The main varieties grown are: White Burley, Mont-Calme jaune and Mont-Calme brun. The organization and economic significance of the industry are discussed and notes are given on the activities of the Tobacco Research Institute, Mont-Calme.

3203. FERRER, L. G.

A review of experiments and investigational work on tobacco of the aromatic cigarette type in the Philippines (1921-41).

Philipp. J. Agric., 1951 (issued Nov. 1952), 16: 85-96, bibl. 13.

Notes are given on varietal, cultural and fertilizer trials and on investigations on breeding, chemistry, curing, and pest and disease control. The commercial possibility of cigarette tobacco growing has been conclusively proved but the development of an industry faces 3 problems: the provision of flue-curing barns, the operation of reconditioning plant, and the competition of U.S. cigarettes.

3204. TURPIN, H. W.

Research and education in agriculture.

Fmg S. Afr., 1952, 27: 583-600.

In this report by the Director of Agricultural Education and Research for 1951/52 the work of the Central Tobacco Research Station is outlined. *Agronomy*: In Orinoco tobacco grown in a 3-year rotation on noritic soil increasing the N in complete NPK fertilizer from 24 to 72 lb. per morgen significantly increased yields; with high N, increased K improved quality; increasing available P_2O_5 above 140 lb. per morgen did not appreciably improve yields. With applications up to 240 lb. available K_2O per morgen there was no significant difference between chloride and sulphate forms; above this level both forms depressed yields. In rotation trials on 2 soil types the best tobacco was produced after a winter fallow. *Plant breeding*: Yield, quality and resistance to mosaic were major factors in the selection of varieties and strains. Among species tested for resistance to mildew *N. glauca*, *N. dirugla* and *N. digluta* were outstanding. Where varieties were grown in adjacent rows only 0.5% cross-fertilization occurred. *Chemistry and physiology*: Studies included changes in free amino acids during curing, the uptake of radioactive phosphorus by plants, the effect of trace elements and the use of oils to suppress suckers. *Entomology and plant pathology*: Eelworm was controlled in seedbeds with DD and Dowfume W.40, and a mixture of DDT, copper oxychloride and sulphur controlled diseases and insect pests. BHC caused plant distortion. Arathane W.P.25 sprays controlled mildew.

3205. ARGENTINA.

Centro nacional de investigaciones agropecuarias. Instituto de fitotecnia. División técnica de producción tabacalera. Instituto de botánica agrícola. (National centre of agronomic research. Phytotechnical institute. Technical division of tobacco production. Institute of agricultural botany.)

Idia, 1952, 5 (59/60): 3-10 and 25-30.

Laboratory of biochemistry (p. 10). Experiments showed that the N content of *Nicotiana rustica* varies with the stage of growth of the plant and reaches its maximum between the 5th and 8th week after flowering. *Technical division of tobacco production* (p. 10). In a series of experiments on the commercial tobacco, Criollo Salteño, the order of merit of the varieties at present cultivated was (1) Criollo Salteño 1201, (2) Hoja Parada, (3) Hoja di Oro, and (4) Amarilhinho. Other studies concerned the methods of harvesting and curing; the 2 best were harvesting the whole plant and barn-curing, and harvesting individual leaves and mixed drying. *Institute of agricultural botany* (p. 27). Ca cyanamide at 340 g. per sq. m. effectively controlled weeds in tobacco nurseries in N.E. Argentina.

3206. FIORENTINO, C.

Il Salento—tabacco ad impiego misto. Cultivazione e cura nella provincia di Lecce. (The cultivation and curing of Salento tobacco in Lecce Province.)

Tabacco, 1953, 57: 11-24, bibl. 2, illus.

The unimportant Salento variety is grown on a small scale in the province of Lecce. A description is given of the methods of cultivation and curing, by the so-called "campagnole" cure which consists partly of sun- and partly of air-drying.

Varieties.

3207. BOLSUNOV, I.

What Austria is doing to increase and improve varieties of own leaf.

Tabacco, 1952, 134 (17): 31, 63, 167, illus.

Notes are given on the breeding of giant varieties at the Austrian Tobacco Breeding Station at Fuerstenfeld in Styria. Economically interesting results have been obtained with Virginia, burley and cigar tobaccos by modern breeding methods, an elaboration of the transgression method, and crossing and back crossing. Difficulties that had to be contended with were the natural tendency of large plants to mature their upper leaves late, and the susceptibility of giants to weather, wind and disease. In addition to increased yields the new giant varieties have the advantage of much lower production costs per unit weight of leaf-crop thanks to the reduced number of plants per unit area and their reduced disposition to sucker. The average annual yields at Fuerstenfeld in 1949 and 1950 of some new Austrian and some known giant Virginia varieties are given.

3208. BOLSUNOV, I.

Austria is growing new varieties of nicotine-poor and nicotine-rich leaf.

Tabacco, 1952, 135 (5): 65, 160, illus.

The breeding of nicotine-poor varieties of tobacco for cigar, cigarette and pipe leaf and of nicotine-rich

varieties for nicotine extraction has been in progress for many years at the Austrian Tobacco Monopoly's Tobacco Breeding Station. *Nicotine-poor varieties*. In cigar leaf varietal trials in 1950 and 1951 the U.S. varieties Connecticut Havana and Havana 142 had nicotine contents of 1.06-1.93% while the Austrian varieties Carmencita, ATAFEG green, Styria I and Indiana had 0.28-0.75% and the newer Austrian varieties Torero, Vindobona, and Habanera had only 0.07-0.18%. Carmencita, Habanera, Torero and ATAFEG green gave considerably higher yields than the American, French, Spanish and Italian varieties included in the trial. Habanera had twice as many leaves as other varieties and very short internodes. *Nicotine-rich varieties*. Trials of *Nicotiana rustica* varieties bred in Austria and other countries were made in 1948-51. The highest yields in nicotine per ha. were given by Zlag (France) 139 kg., B293 (Austria) 125 kg. and B422 (Austria) 108 kg.

3209. BOLSUNOV, I.

Zur Prüfung neuer interessanter Tabaksorten aus dem Weltsortiment in der Tabakzüchtungsstation in Fürstenfeld. (The testing of new interesting tobacco varieties from a world-wide collection at the Tobacco Breeding Station, Fürstenfeld.)

Fachl. Mitt. Österreich. Tabakregie, 1951, Hft 2, pp. 6-11, illus. [received 1953].

Notes are given on the characteristics of a large number of tobacco varieties obtained from various countries in Europe, Asia, Africa and America. They are grown at Fürstenfeld to ascertain their suitability for Austrian conditions, though some, particularly the highly aromatic oriental types, are used only for breeding.

Growth phenomena.

3210. TOMBESI, L.

Ricerche di fisiologia e di biochimica su *Nicotiana tabacum*. Nota 1.—Sui consumi idrici delle varietà Virginia Bright, Maryland e Perustitza. (Physiological and biochemical studies on *Nicotiana tabacum*. Note 1.—On water consumption in the varieties Virginia Bright, Maryland and Perustitza.) [English summary 2 p.]

Tabacco, 1953, 57: 71-82, bibl. 6, illus.

Pot experiments were undertaken at the Stazione Chimico-Agraria in Rome in 1951 and 1952 to determine the unitary water consumption of Virginia Bright, Maryland and Perustitza as expressed in litres transpired for the formation of 1 kg. dry organic matter. Consumption was highest in Virginia Bright, followed by Perustitza and Maryland. The 1952 figures for Virginia Bright were 658 l. per pot of 5 plants with normal water supply and 691 l. with reduced water supply. It was concluded that the water nutrition problem of tobacco should be evaluated not in terms of the maximum yield for the minimum water consumption but—within the limits of soil and climatic conditions—in terms of the maximum yield of the best cured product for the variety with the minimum water consumption. The number of stomata per unit of leaf surface is greater in plants raised with a low water supply.

3211. STEINBERG, R. A.

Low temperature induction of flowering in *Nicotiana rustica* \times *N. tabacum* hybrid.

Plant Physiol., 1953, 28: 131-4, bibl. 2.

The mammoth-rustica tobacco originated as a cross between *Nicotiana rustica* and a presumed short-day mammoth variety of *N. tabacum*. It has indeterminate growth and has very rarely been known to flower even under short-day conditions. Experiments described here show that it can be induced to flower by exposure to low temperatures. Plants raised from the resulting seed did not, however, show a uniform flowering response to temperature. It is concluded that mammoth-rustica exemplifies a new type of flowering response in *Nicotiana* species. A low temperature requirement for blossoming has hitherto been associated primarily with certain long-day biennial forms. Day-neutral *Nicotiana* plants, it now appears, may also possess a low temperature requirement for flowering.—Bur. Plant Ind., Beltsville, Md.

3212. GIGANTE, R.

Alterazioni dovute ad eccessi di temperatura in piantine di tabacco nei semenzai del Leccese. (Alterations due to extreme temperatures in tobacco nursery plants in Lecce.)

Boll. Staz. Pat. veg. Roma, 1951 (issued 1953), 9: 83-92, bibl. 8, illus.

Two abnormalities were encountered in tobacco plants in nurseries in Lecce in 1950. The first, observed on very young plants in March, was due to low temperatures. Its symptoms were yellow or whitish patches at the edges and tips of the leaves, pimpliness, and somewhat irregular growth; leaves produced later in the season were healthy. The second, observed in May-June when the plants were ready for transplanting, was due to high temperatures, and was commoner among more densely growing plants and on leaves exposed to the sun. The symptoms were silvery white patches on the leaves, very variable in shape and size and sometimes covering the whole leaf.

3213. PEARSE, H. L., AND NOVELLIE, L.

South African tobaccos. I. Preliminary identification of amino-acids and other constituents.

J. Sci. Food Agric., 1953, 4: 108-12, bibl. 23.

Paper chromatography is a very suitable method of making a preliminary survey of tobacco leaf composition. A description is given of methods of preparing the leaf for the purpose. A list is given of the amino-acids, sugars and polyphenols detected by chromatography in the leaf of 219, Amarelo and Yellow Mammoth.—Centr. Tobacco Res. Stat., Rustenburg, and Nat. Chem. Res. Lab., Pretoria.

3214. SCHWARTZ, D., FARDY, A., AND CUZIN, J.

Nouvelles expériences de défoliation. Influence des diverses feuilles sur les fonctions de l'apex chez *Nicotiana tabacum*. (New experiments on defoliation. The influence of various leaves on the function of the apex in *Nicotiana tabacum*.)

Ann. Inst. exp. Tabac Bergerac, 1952, pp. 45-60, illus., from abstr. in *Bol. Inst. Invest. agron. Madrid*, 1952, 12: 657-8.

Mature leaves of tobacco tend to accelerate the cytohistological development of the apex and its rate of

leaf production, while young leaves have no effect on its cyto-histological development and retard its rate of leaf production. Mature leaves as well as young leaves, however, tend to limit the total number of leaves produced. These effects are observable throughout the whole vegetative period of growth.

3215. ČIRKOVSKIJ, V. I.

Periodicity of dormancy in tobacco seeds.

[Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 82:

1013-16, bibl. 1.

Tobacco seed held at the Mikojan Tobacco Research Institute, Krasnodar, at 60% humidity, temperatures in winter 11°-17° C., in summer 16°-26° C., germinated readily during any period of 5-years' storage. When, however, the seed was stored in a desiccator over crystalline NaOH, a practically complete dormancy set in from May till October of each year. After one year's storage in the desiccator seed placed in an atmosphere of 60-75% humidity progressively lost its capacity for dormancy. In further trials it was shown that seed held in a relatively humid atmosphere at 9° C. became dormant during both summers of the trial period, while seed stored at 17° C. became semi-dormant during the first summer and retained its viability during the second. A difference in varietal behaviour was also noted, seeds of local varieties entering into dormancy less readily than those of introduced plants.

Soil management and nutrition.

3216. FERRARI, R.

Algo sobre el transplante mecánico del tabaco. (Mechanical transplanting of tobacco.)

Bol. Prod. Fom. Agric., B. Aires, 1951, 3 (19): 2-5, from abstr. in *Biol. Abstr., Sect. D*, 1953, 27, No. 7463.

In order to make more effective use of the short periods available for transplanting following rains, it is recommended that greater use be made of mechanical means in transplanting tobacco plants in Argentina. Methods of transplanting and a one-row planter capable of planting 10,000 plants per hr are described.

3217. OGDEN, W. B.

Wisconsin tobacco soils; their fertility and management.

Bull. Wis. agric. Exp. Stat. 493, 1951, pp. 20.

Fertilizer recommendations are made for the build up and maintenance of soils at the "luxury" level of fertility needed to produce high quality tobacco.

3218. ELLIOT, J. M.

Growing flue-cured tobacco without manure.

Lighter, 1952, 22 (4): 12-14, from abstr. in *Soils and Ferts*, 1953, 16, No. 761.

Field trials on grey-brown podzolic soils of low organic matter content showed that tobacco returns were higher and maintenance of soil organic matter was better following disced-in mature rye, if simultaneously fertilized with 500 lb./acre of 10-3-10 mixture, than if dressed with 5 tons/acre of farmyard manure. Each tobacco crop in the two-year rotation received 1,000 lb./acre of 2-12-10 fertilizer, and leaf grade was improved by rye fertilization without manure.

3219. GILMORE, L. E.

Nitrogen constituents of burley tobacco resulting from ammonium and nitrate nutrition.

Canad. J. agric. Sci.,* 1953, 33: 16-22, bibl. 19.

Samples of top and bottom leaves and stalks of burley tobacco plants grown in sand, with a constant supply of nitrogen nutrient containing 0, 33, 66 and 100% as ammonium ions and the remainder as nitrate ions, were analysed for protein and the soluble nitrogen constituents: nitrates, nicotine, ammonia and amides. High concentrations of protein and nicotine are associated with high ammonium nutrition, maximums occurring when plants received all or two-thirds of the nutrient nitrogen as ammonium ion. The storage of ammonia and nitrate in the tissues increased progressively in proportion to their respective nutrient supply. The maximum storage of nitrate nitrogen is several times that of ammonia nitrogen. Amides accumulate increasingly with the ammonium nutrient supply. Especially in the stalks and upper leaves of plants, the contents of both the total soluble nitrogen and the insoluble (protein) nitrogen display increasing trends as the proportion of ammonium nutrient is increased. [Author's abstract.]

3220. BLUME, J. M., AND HALL, N. S.

Calcium uptake by tobacco from band applications of fertilizer materials.

Soil Sci., 1953, 75: 299-306, bibl. 6, being *N.C. J. Ser. Pap.* 433.

A field experiment in which radio-calcium was used to measure the contribution of $\text{CaH}_4(\text{PO}_4)_2 \cdot \text{H}_2\text{O}$, CaCO_3 , and CaSO_4 to the calcium nutrition of the tobacco plant was carried out on a moderately fertile Norfolk loamy sand. The plants derived only 2-6% of their Ca from these fertilizer salts, even though the soil was not particularly well supplied with this element. By contrast, 26-35% of the P in the plant was derived from the application of $\text{CaH}_4(\text{PO}_4)_2 \cdot \text{H}_2\text{O}$, despite the fact that the available P content of the soil was high. Ca was utilized more efficiently by tobacco when the three salts were applied in individual bands 3 inches apart than from a single band of the mixed salts, presumably because of the larger soil volume with which the fertilizer was mixed by the former method of application. Both Ca and P derived from fertilizer applied in a band to the side of the plant were accumulated in the leaves directly above the fertilizer band to a larger extent than in the leaves on the opposite side of the plant. Analysis of soil samples taken at the conclusion of the growth period indicated that there had been no movement of Ca from the fertilizer materials more than 3 inches laterally or 4 inches downward. It is concluded that with proper precautions radio-calcium can be used safely in field experiments. [From authors' summary.]

3221. KRIŠTOF, S., AND MARKOVIĆ, N.

Uticaj bakra i mkrog uglja na sadržaj nikotina i limunske kiseline kod *Nicotiana rustica* L. "Kapa". (Effects of copper and brown coal on the nicotine and citric-acid contents of *Nicotiana rustica* L. "Kapa".) *Zemlj. Bilj.*, 1952, 1: 135-49, bibl. 21, from abstr. in *Soils and Ferts*, 1953, 16, No. 762.

* Formerly *Scientific Agriculture*.

The tobacco was grown on a mixture of bog soil and sand in Mitscherlich pots treated with conventional rates of NPK or 250-1,000 kg./pot of lignite, in presence or in absence of 1.5 g. of CuSO_4 . The NPK improved growth better than did brown coal, but the latter very considerably increased nicotine content, particularly if applied with Cu. The citric-acid content of leaves was decreased rather than increased by treatments.

3222. McMURTRY, J. E., JR., AND ENGLE, H. B.

Effect of stable boron isotopes on growth of tobacco in solution cultures.

Plant Physiol., 1953, 28: 127-30, bibl. 8.

It is generally accepted that isotopes, whether stable or radioactive, function biologically in the same way as the commonly occurring forms. An experiment was designed to compare the effects of the stable isotope of boron, B^{10} , with those of boron derived from reagent grade of boric acid, B^{11} , on the growth of tobacco plants grown in nutrient culture. Although in every case the total yields were higher from B^{10} than from B^{11} , the difference, based on weights of individual plants, was not statistically significant where a concentration of 0.5 p.p.m. boron had been used. Where a concentration of 0.1 p.p.m. had been used the difference appeared to be significant. The only difference observable during the growth of the plants was the earlier occurrence of deficiency symptoms where the low rate of B^{11} was used. It is concluded that B^{10} produces essentially the same growth responses as B^{11} in tobacco plants when used in solution cultures.—Bur. Plant. Ind., Beltsville, Md.

Diseases and pests.

(See also 2794, 3082.)

3223. STEERE, R. L., AND WILLIAMS, R. C.

Identification of crystalline inclusion bodies extracted intact from plant cells infected with tobacco mosaic virus.

Amer. J. Bot., 1953, 40: 81-4, bibl. 11, illus.

A process is described for the intact removal of the crystalline inclusion bodies from hair cells of tobacco plants infected with tobacco mosaic virus. By electron microscopy it is found that the crystals consist apparently of nothing but particles of tobacco mosaic virus and a volatile solvent. Many infective virus particles are present. [From authors' summary.]—Univ. Calif.

3224. SZIRMAI, J.

A new variety of root virus of seedlings. [Russian, with English and German summaries 1/2 p. each.]

Acta Agron. Hung., 1952, 2: 275-89, bibl. 4, illus.

In 1950 a variant of the necrosis virus of tobacco was found attacking roots of transplants in greenhouses and seedling beds, tomato, tobacco, paprika, *Datura*, *Pelargonium* and *Primula* being among the species affected. The virus usually appeared in conjunction with the fungus *Thielaviopsis basicola*, which could be diluted 50,000-fold, and was isolated from purified tobacco juice in rhomboidal crystals. Partial control was obtained by sun-drying the soil and ful control by soil sterilization with formalin (2.5 l./m³).

3225. MARCELLI, E.

Un virus necrotico isolato da piante di tabacco affette da mosaico. (A necrotic virus isolated from tobacco plants infected with mosaic.)

Not. Mal. Piante, 1952, No. 21, pp. 51-6, bibl. 11, and *Tabacco*, 1953, 57: 83-92, bibl. 11, illus.

Notes are given on a necrotic virus isolated from the roots of tobacco plants infected with mosaic. It is thought to be *Marmor lethale*.—Osservatorio Malattie Piante, Pavia.

3226. WILKINSON, J.

Some effects induced in *Nicotiana glutinosa* by the "aspermy" virus of tomato.

Ann. Bot. Lond., 1953, 17: 219-23, bibl. 9, illus.

Inoculation of *Nicotiana glutinosa* with the virus causing "aspermy" disease in tomato causes malformation of all parts, increased development of lateral branches, foliar and floral distortion, and reduced production of seed. Some anthers and ovaries become necrotic, but many undergo sporogenesis. At the first meiotic division the pachytene threads of some spore mother-cells exhibit collapse, accompanied by abnormal multiplication of nucleolar bodies; whilst pairing fails in one and sometimes two or three bivalents, resulting in a proportion of chromosome-deficient gametes, with consequent production of misshapen pollen-grains, together with microcytes. [Author's abstract.] This is considered to be the first record of aberrations induced in a complete meiotic sequence by the action of a virus.—Univ. Coll., Exeter.

3227. KÖHLER, E.

Gomphrena globosa als Wirtspflanze verschiedener Mosaikviren. (*Gomphrena globosa* as a host plant of several mosaic virus diseases.)

Nachr. Bl. dtsch. Pfl. Sch. Dienst. *Braunschweig*, 1953, 5: 21-2, bibl. 4, illus.

Rattle virus of tobacco and spotted wilt of tomato are among the virus diseases that cause symptoms on the test plant *Gomphrena globosa*.—Inst. f. Virusforschung, Celle.

3228. GONDO, M.

Respiration of virus diseased tobacco plant. (I). [Japanese, with English summary 10 lines.]

Bull. Fac. Agric. Kagoshima Univ., 1952, 1: 1-3, bibl. 7.

The respiration-ratio per 100 cm.² of leaves of a mature healthy plant was superior to that of a diseased one growing under the same conditions. By contrast, the respiration-ratio of young diseased plants showing severe symptoms was superior to that of healthy, mature plants. [From author's summary.]

3229. AKUNE, S., AND KOGA, K.

Studies on potassium content of virus-diseased tobacco plants grown with different quantities of potassium. [Japanese, with English summary 11 lines.]

Bull. Fac. Agric. Kagoshima Univ., 1952, 1: 4-9, bibl. 7.

A comparison was made of the K content of virus-free

and virus-infected tobacco plants supplied with different levels of K fertilizer. In virus-free tobacco there was little difference in the K₂O content in fresh matter in leaves from the heavy K and standard K plots, but the content in leaves from light K was always lower than the other two; in virus-infected tobacco the K₂O content of leaves from the heavy and standard K blocks was smaller than in the corresponding virus-free leaves but that of leaves from the light K block was larger than that of the corresponding virus-free leaves. The relation between respiration and catalase action under light K was not the same as that under heavy and standard K.

3230. JONES, L. H.

Frenching of ragweed (*Ambrosia artemisiifolia* L.).

Plant Physiol., 1953, 28: 123-6, bibl. 6, illus., being *Contr. Mass. agric. Exp. Stat.* 813.

It had been shown previously [H.A., 18: 2810] that tobacco grown on "frenching" soil will produce frenching symptoms at 35° C. but not at 21° C. In the present investigation it was shown that the following plants will also exhibit frenching symptoms when grown on frenching soil at a temperature of 35° C.: ragweed (*Ambrosia artemisiifolia*), sorrel (*Oxalis stricta*), tomato and squash. No symptoms appeared on pepper (*Capsicum frutescens*) or on the weeds *Galinsoga parviflora*, *Polygonum pensylvanicum*, *Portulaca oleracea* or several genera of the grass family. It is suggested that the technique of using a relatively high soil temperature with a soil known to contain the frenching factor is a possible procedure for separating and studying the symptoms of true frenching without confusing them with those of other diseases.

3231. HOPKINS, J. C. F., AND RILEY, E. A.

Bacterial leaf spot of *Nicandra physaloides* Gaertn.

Rhod. agric. J., 1952, 49: 343-5, bibl. 1, illus.

A bacterial disease of the common weed *Nicandra physaloides* closely resembling tobacco wildfire has been shown not to be due to *Pseudomonas tabaci*, the cause of wildfire. Inoculations from *N. physaloides* to tobacco produced symptoms of wildfire in the latter, but this reaction was shown to be due to a toxin alone and no bacterial infection ensued. The implication of this in relation to reports of wildfire in plants other than tobacco are discussed. [Authors' abstract.]

3232. SEMPIO, C., AND LUCACCI, G.

Lotta contro l'oidio del tabacco. (Tobacco powdery mildew control.) [English summary ½ p.] *Tabacco*, 1953, 57: 45-55.

Experiments on the control of tobacco powdery mildew (*Erysiphe cichoracearum*) were conducted in 1952 in central Italy where the disease has become serious in recent years. Attacks begin when the leaves are approaching maturity, usually in early August, and reach a peak about 4 weeks later. The basal leaves are the most severely attacked, the apical ones being rarely affected. All varieties of Virginia Bright are attacked and also Burley and Kentucky. S dust at 100 kg./ha. and activated S plus 10% smokeblack were compared. The latter had no ill effect on the leaf. The application to the soil between alternate lines of 100-150 kg. S per ha. mixed with 10% smokeblack is recommended in warm years on sunny sites for vigorous crops with

dense foliage. Under cooler conditions spraying with 0.2% polysulphide or 0.4% volatile S is recommended.

3233. ALLEN, N., AND OTHERS.

Effect of soil treatments with DDT, benzene hexachloride, and toxaphene on tobacco, cotton and cowpeas.

Tech. Bull. U.S. Dep. Agric. 1047, 1951, pp. 22, bibl. 22, illus. [received 1953].

Experiments were carried out at Florence, South Carolina, during the period 1947-49, to determine the effect of soil applications of BHC, DDT and toxaphene on tobacco, cotton and cowpeas grown with 2 winter cover-crops in a 3-year rotation. DDT was applied at 10 and 20 lb. per acre each spring and at 40 and 100 lb. in 1947 only. The only treatment that seemed to affect tobacco was the 100 lb. dosage, which caused some chlorine injury characterized by glossy, brittle leaves in 1947, and appeared to affect the yield and burning quality in 1949. Technical BHC was applied annually at 16.7 lb. per acre and at 12.5 lb. with 2.5 lb. DDT. In 1947 it was applied also at 83.3 lb. per acre and at 50 lb. with 10 lb. DDT. All these treatments affected the flavour of tobacco. The 50 and 83.3 lb. applications reduced the stand of a root knot resistant variety in 1947 when the plants were transplanted shortly after the insecticides had been applied. In 1948 and 1949 all applications gave some control of the root knot nematode, and in 1949 a slightly higher yield was obtained from the plots that had received the 2 heaviest amounts in 1947.

3234. MCCHLERY, R.

Tainting of tobacco by a dichloropropene-dichloropropane soil fumigant.

Nature, 1953, 171: 578.

The conclusions reached by Shepherd [*Nature*, 1952, 170: 1073-4; *H.A.*, 23: 2017] regarding the tainting of tobacco in Southern Rhodesia following the use of D-D are criticized as being based on inadequate and possibly erroneous evidence.

3235. MARCELLI, E.

Disinfestazione di terreni infestati da *Heterodera marioni* (Cornu) Goodey a mezzo di D-D. (The disinfection with DD of soils infested with *Heterodera marioni*.)

Tabacco, 1953, 57: 25-9, illus.

A description is given of an experiment in the province of Pisa on the control of *Heterodera marioni* with DD in a heavily infected tobacco farm. Six plots were injected with DD at 300 kg./ha. to a depth of 15 cm. every 30 cm. 20 days before planting, and four were left untreated. Fifty plants per plot were subsequently examined with the following results: treated plants—26% no attack, 58% with 1-5 knots, 16% with 5-10 knots; untreated plots—1% no attack, 11% with 1-5 knots, 18% with 5-10 knots, 38% with 10-20 knots, and 32% with 20 knots and over.

Harvesting, curing and storing.

3236. MÁNDY, G.

Hogyan alakul a szárított dohány levelek színesedése levélemeletenként a különféle időpontokban. (The pigmentation of dried tobacco leaves from various levels on the plant harvested at different times.) [English and Russian summaries 1 p. each.]

Növényterm., 1952, 1: 51-66, bibl. 2.

As a result of investigations conducted at the Tobacco Research Institute, Budapest-Érd, air-dried leaves of 15 Hungarian and foreign tobacco varieties are classified according to colouring in the following 3 groups: (a) light, (b) brownish, and (c) predominantly brown. Most valuable for the manufacture of cigarettes are those of group (a) to which among Hungarian varieties 2 each of the Kerti and Szabolcs types belong. The colouring of the foliage was found to be correlated with its age. Thus young leaves turned green or brownish green; young mature leaves light brown, ochre or yellow; fully mature leaves brown; and senescent leaves green or brownish green. A similar pigmentation could also be observed in a succession of leaf levels or in leaves from a single level during different stages of development.

3237. ANON.

Fermentation pré-accelérée du tabac. (Accelerated fermentation of tobacco.)

Rapp. Cons. Exp. Rech. agron. Algér. 1951/52, 1952, pp. 255-6.

A study of the enzyme processes has made possible a very important practical improvement in tobacco fermentation. The new process (which is not described) employs a material similar in appearance to, but fundamentally different from, that used for fumigation *in vacuo*. It reduces the fermentation period (70-90 days by the natural process) to 2 days and destroys insects and moulds.

3238. CIFERRI, R.

Degradazione dell'azoto protidico nelle foglie di tabacco "Burley" curato ad aria. (Loss of protein in Burley tobacco during air curing.)

Tabacco, 1953, 57: 3-10, bibl. 7.

A study of the total and protein N content of Burley tobacco leaves during air curing was conducted at the Botanical Institute of Pavia University. It was found that a protein loss begins about 12 hours after the commencement of drying and continues up to the 60th to 96th hour, the time of permanent change of leaf colour. The losses, 4.0-14.2% in the leaf blade and 0.4-21.1% in the midrib, were less than those found by other workers in other varieties. Data are given for the blade and midrib of basal, median and apical leaves.

3239. CIFERRI, R.

L'imbrunimento del "Virginia bright" nella cura. (Browning of Virginia bright tobacco during curing.)

Tabacco, 1953, 57: 35-44.

An alteration which commonly occurs in Virginia bright leaf during curing is encountered in varying degree in all varieties and under all methods of curing. It is characterized by dry, brittle, brown patches in which the mesophyll is thin. It appears to be analogous to the "trashy leaf" of eastern Australia. Preliminary investigation showed that it is due to a deficiency in glucides coupled with a normal content of N.

3240. GUNDRY, B. G.

The "Gundry" tobacco furnace.

Rhod. agric. J., 1952, 49: 352-61, illus.

A description with detailed plans is given of the construction of the wood-burning "Gundry" furnace,

which has been widely used in Rhodesia over the past 15 years. It is simple and cheap to erect and on an average will use about 1½ cords of wood to cure a barn (16×16 ft.) containing 1,000 lb. tobacco. Temperature control is simple and accurate.

3241. HARLAND, R. B.

Hints on handling and grading.

Rhod. Fmr., 1953, 28 Jan., pp. 11, 14-15, and 4 Feb., p. 12.

The author makes suggestions for the storing and subsequent grading of flue-cured Virginia tobacco, including the dimensions of bulk stores and of a grading and baling shed in which a grading gang of 50 is employed. An average output of 22 lb. per person employed per day is considered satisfactory, although higher figures are sometimes reported.

3242. PHILLIPS, M., AND BACOT, A. M.

The content of uronic acids in several grades of flue-cured, type 12, tobacco.

J. Ass. off. agric. Chem. Wash., 1953, 36: 123-8, bibl. 18.

Data are presented on the content of uronic acids (as anhydrides) in 23 grades of stemmed, flue-cured, type 12, tobacco and of one sample of tobacco "waste". The results show that, in general, the tobacco grades which were relatively heavier in body and had the greatest tensile strength contained the lowest percentage of uronic acids as anhydrides, while those which were distinctly thinner in body and had the least tensile strength had the highest percentage of uronic acid anhydrides. The percentages of uronic acids (as anhydrides) were also found to be directly related to the content of "waste" and possibly also mildness in tobacco. [Authors' summary.]

3243. SANTUCCI, F.

Il *Tenebrioides mauritanicus*. (*Tenebrioides mauritanicus*.)

Tobacco, 1953, 57: 56-68, bibl. 15, illus.

Evidence is presented that the beetle *Tenebrioides mauritanicus* occasionally attacks stored tobacco.

Growers are recommended to keep stores clean and to spray them occasionally with insecticides. Methods of fumigation are described.

Noted.

3244.

a BOLSUNOV, I.

Die Ergebnisse und Aussichten der Tabakzüchtung in Österreich. (Results and prospects of tobacco breeding in Austria.) *Fachl. Mitt. österreich. Tabakregie*, 1951, Hft 1, pp. 11-17, illus. [received 1953].

b CUZIN, J., AND SCHWARTZ, D.

Microdosage photo-colorimétrique des bases nicotiniques dans le tabac en vert. (Photocolorimetric microdetermination of nicotine bases in green tobacco.) *Ann. Inst. exp. Tabac Bergerac*, 1952, 1: 61-9, illus., from abstr. in *Bol. Inst. Invest. agron. Madrid*, 1952, 1: 663.

c ROCKWELL, G. R., Jr.

Flue-cured tobacco: price differences among types 11(a)-13. *Market. Res. Rep. U.S. Dep. Agric.* 9, 1952, pp. 12.

d SCHWARTZ, D., CUZIN, J., AND FARDY, A.

Méthode rapide de cotation des teneurs en nicotine sur tabac frais. (A rapid method of determining nicotine content in fresh tobacco.) *Ann. Inst. exp. Tabac Bergerac*, 1952, 1: 77-86, illus., from abstr. in *Bol. Inst. Invest. agron. Madrid*, 1952, 12: 663.

By the picric reaction under the polarizing microscope.

e TAKAHASHI, W. N., AND ISHII, M.

A macromolecular protein associated with tobacco mosaic virus infection: its isolation and properties.

Amer. J. Bot., 1953, 40: 85-90, bibl. 16, illus. See also *H.A.*, 22: 2793f.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Culinary and spice plants.

(See also 3196d, 3511, 3626, 3641, 3670.)

3245. KRISHNA, S., AND BADHWAR, R. L.

Aromatic plants of India. Part XVI. Family 54—Umbelliferae.

Suppl. J. sci. industr. Res., India, 1953, 12 (2): 267-90, bibl. extensive, illus.

These highly condensed notes contain information, so far as it is available, on certain botanical characteristics, distribution, cultivation and/or harvesting and physical constants of the oils of plants of the following genera: *Cuminum*, *Daucus* notably *Daucus carota* (carrot), *Dorema*, *Eryngium*, *Ferula* notably *F. jaeschkeana* and *F. nartherx* (asafoetida), *Foeniculum* notably *F. capillaceum* (fennel), *Heracleum*, *Oenanthe*, *Osmorhiza*, *Petroselinum* notably *P. crispum* (parsley), *Pimpinella* notably *P. anisum* (anise), *Prangos*, *Selinum*, *Seseli*, *Sium*, *Trachyspermum* notably *T. ammi* and *T. roxburghianum*.

3246. FAROOQ, M. O., OSMAN, S. M., AND AHMAD, M. S.

The fixed oil from the seeds of *Carum copticum* Benth. (*Ptychotis ajowan*).

J. Sci. Food Agric., 1953, 4: 132-4, bibl. 7.

The umbelliferous Indian plant *Carum copticum* has attracted attention for its thymol content. Petroselinic acid was found to be the major component of the fatty acids of the fixed seed oil. Linolenic acid and any saturated acid other than palmitic were absent.

3247. JAMAICA DEPARTMENT OF AGRICULTURE.

Investigations 1950-51. Cultivated trees, shrubs and vines: Ginger.

Bull. Dep. Agric. Jamaica 49, [1953?], pp. 118-19.

In trials at 2 stations fertilizers were applied to ginger 2 and 6 months after planting at the rate of 3 cwt. 21% sulphate of ammonia, 4 cwt. 18% superphosphate and 2 cwt. 60% muriate of potash per acre. At one station

there was a 21% response to N but no clear response to P and K; at the other there was no clear response to any fertilizer. There was some evidence that P reduced dry matter content.

3248. TONNIER, J.-P.

Amélioration des plants. Vanillier. (Improvement of plants. *Vanilla*.)

C.R. Rech. agron. Madagascar, 1952, No. 1, pp. 55-9, illus.

Species collections exist at Ivoloïna and Alaotra. Notes are given on: laboratory methods of germinating seed; germination in the field of *Vanilla madagascariensis* (natural regeneration common) and *V. planifolia* (rare); transfer of laboratory seedlings to natural conditions; breeding; and fusarium root rot (*Fusarium batatas* var. *vanillae*) which can be prevented on an experimental scale by soil inoculation with 0.5% Soprasan. Work in progress includes growth studies, immunity to fusariosis, research on clones with indehiscent pods rich in vanillin, and crossing *V. planifolia* with promising clones.

3249. SAREJANNI, J. A.

Une maladie du lentisque cultivé. (A disease of the cultivated mastic tree.)

Ann. Inst. phytopath. Benaki, 1952, 6: 19-22, bibl. 5.

The mastic tree (*Pistacia lentiscus*) is cultivated very extensively on the island of Chios, where its principal disease is a dry rot of the wood. On infected branches the leaves become dry and remain attached for a long time. Polyporous fructifications appear on the trunk. The disease enters through the tapping wounds and seems chiefly to affect old trees. The fungus appears to be identical with *Fomes rimosus* which is known to attack other species of *Pistacia* but has not elsewhere been reported on *P. lentiscus*. The preventive measures suggested are destruction of the fructifications as soon as they appear, and propagation only from young, healthy trees.

3250. KEMP, W. S.

Culinary herb production: a unique New Zealand industry.

N.Z. J. Agric., 1953, 86: 254-5, illus.

Culinary herbs are produced by a small commercial company in Central Otago. The principal crop is thyme (*Thymus vulgaris*) which grows abundantly in the district, having escaped from cultivation. Mint (*Mentha* sp.) which has likewise spread from gardens is also harvested. Sage (*Salvia officinalis*) is cultivated in irrigated plots. On flat land harvesting is done by horse-drawn mower, and elsewhere by hand. Thyme can be sun-dried on concrete floors, but sage and mint require more careful drying on racks under shade.

Drug plants.

(See also 2457, 2458, 3196d, 3304d, g, h, k, l, n.)

3251. PETELOT, A.

Les plantes médicinales du Cambodge, du Laos et du Viêt-nam. Tome I. Renonculacées à Cornacées. (The medicinal plants of Cambodia, Laos and Vietnam. Volume I. Ranunculaceae to Cornaceae.)

Arch. rech. agron. Cambodge, Laos, Viêt-nam 14, 1952, pp. 408, bibl. numerous in text.

Much new knowledge on Indo-Chinese medicinal plants has been gained and the number of species known to science has doubled since the author, who is the Director of the Botanical Division of the Scientific and Technical Research Centre at Saigon, collaborated in the publication of the Catalogue of the Products of Indo-China, Medical Products, 1928-35. The present work consists of 4 volumes. The 3 forthcoming ones cover the Caprifoliaceae to Plantaginaceae; Amaranthaceae to ferns; therapeutic tables and botanical, common, vernacular and Chinese names. In the current volume the information given for each species includes names, description, distribution and uses.

3252. WEBB, L. J.

An Australian phytochemical survey—Part

II. Alkaloids in Queensland flowering plants.

Bull. C.S.I.R.O. Aust. 268, 1952, pp. 99, bibl. 28.

The systematic survey of native plants in Queensland for alkaloids and other chemical compounds [see *H.A.*, 20: 3028] has been continued. Only angiosperms were tested and the principal area covered was the rain forest. Nine families are outstandingly rich sources of alkaloids. The results are tabulated. Methods of testing and factors affecting alkaloid content are discussed.

3253. STARÝ, F.

Příspěvek k farmakobotanickému výzkumu nejdůležitějších léčivých rostlin z čeledi Solanaceae. (A contribution to the pharmacobotanical study of the most important medicinal plants of the Solanaceae.) [English and Russian summaries ½ p. each.]

Sborn. čsl. Akad. Zeměd., 1952, 25: 333-42, bibl. 34, illus.

The systematics of *Atropa*, *Scopolia*, *Hyoscyamus*, and *Datura* spp. are discussed. Alkaloid contents of *Atropa pallida*, *A. belladonna*, *Hyoscyamus niger*, *H. albus*, *H. aureus*, *Datura stramonium*, *D. s. var. tatula*, *D. quercifolia*, *D. metel*, *D. meteloides* and *D. ceratocaula* were determined. Special attention was paid to a thornless form of *D. s. var. tatula* with an alkaloid content of 0.50%.

3254. WILSON, P. M. W.

Formation and transport of alkaloids in solanaceous grafts.

New Phytol., 1952, 51: 301-16, bibl. 26, illus.

When *Atropa belladonna* scions are side-grafted on tomato or *Physalis alkekengi* stocks both scions and stocks are free of "solanaceous" alkaloids. After rooting in sand, *Atropa belladonna* leaves detached from *A. belladonna*/tomato grafts and initially alkaloid-free were found to contain "solanaceous" alkaloids. *A. belladonna* roots grown from alkaloid-free scion tissue still attached to the graft contained alkaloids in concentrations little lower than normal roots. Thus, the presence of a tomato or *Physalis alkekengi* stock does not affect this synthetic property of the *Atropa belladonna* root. Alkaloids were transported both up and down the plant from such scion roots. Alkaloids were found in underground organs, i.e. fine roots, tubers, or fleshy rhizomes of plants normally alkaloid-free (tomato, potato, or *Physalis alkekengi*) which had been in intimate contact with a normal *Atropa belladonna*

plant in an approach-graft union for several months. This suggested a phloem transport of "solanaceous" alkaloids in tomato, potato, or *Physalis alkekengi*. Alkaloids were found in the stocks of *Atropa belladonna*/tomato and *A. belladonna/Physalis alkekengi* grafts, originally alkaloid-free, which had been approach-grafted with normal *Atropa belladonna*. This implied downward transport of alkaloids through *A. belladonna* tissue, alkaloid-free at the time of making the approach-graft. Alkaloids crossed a bridge of tissue from a normal *A. belladonna* plant to an *A. belladonna*/tomato graft. The bridge was so constructed that transport from the normal plant to the *A. belladonna*/tomato graft was allowed only in a downward direction, thus it was shown that alkaloids crossed the bridge in a downward-flowing stream. The conclusion seems justified that alkaloids are translocated in the phloem of the normal *A. belladonna* plant. It is possible that alkaloids are withdrawn from the leaves and enter the phloem with the products of photosynthesis, or alternatively that they leak from the xylem into adjacent phloem. Alkaloid transport in the phloem of *A. belladonna* is, however, subsidiary to transport in the transpiration stream. [Author's summary.]—Univ. Reading.

3255 EVANS, W. C., AND PARTRIDGE, M. W.
Alkaloids of *Datura innoxia*.

Nature, 1953, 171: 656, bibl. 6.

Datura innoxia was found to contain meteloidine in addition to hyoscine and hyoscyamine. From graft experiments it is concluded that the sites of alkaloidal syntheses are the roots for hyoscine and the aerial parts for hyoscyamine; the site of meteloidine synthesis has not been located.—Univ. of Nottingham.

3256. HILLS, K. L., BOTTOMLEY, W., AND MORTIMER, P. I.

Occurrence of nicotine together with hyoscine in *Duboisia myoporoides* R. Br.

Nature, 1953, 171: 435, bibl. 2.

Assays were made by paper partition chromatography of the nicotine, nor-nicotine and hyoscine contents of *Duboisia myoporoides* leaves from plants raised in the open and under glass from New Caledonian seed. The results expressed as percentage dry weight of leaf were: nicotine—open 0.9, glass 0.7; nor-nicotine—open 0.2, glass 0.24; hyoscine—open 0.4, glass 0.41. This appears to be the first time that alkaloids of the tropane and pyridine groups have been observed in the same plant or even the same species. Possibly internal changes involving the pattern or nature of the genes were responsible, or the New Caledonian material may be a relict of a primitive form from which the genotypes of the Australian mainland originated.—C.S.I.R.O., Canberra.

3257. RIZZO, F. J., AND GRÜNWALD, O.
Sarrapia. (*Coumarouna punctata*).

Agric. venezol., 1952, 17 (157): 36-42, bibl. 5, illus.

The leguminous tree *Coumarouna* [*Dipteryx*] *punctata* grows abundantly in natural stands in the State of Bolívar, Venezuela. The traditional practice is to harvest the fruit when it falls to the ground, dry it in the sun, remove the seed and dry this in the shade, and then send the seed to a central factory for the extraction of coumarin. Recent investigations have shown that

the whole fruit, not only the seed, could profitably be used. Large quantities of high quality alcohol can be obtained from the pulp, as well as edible fat and coumarin. Valuable by-products are the pressed cake of the kernel, the fibrous material of the husks and the pulp residue.

3258. GRÜMMER, G.

Beiträge zur Eigenschaftsanalyse der Anfälligkeit von *Papaver somniferum* gegen *Helminthosporium papaveris*. (An analysis of the nature of the infection of *Papaver somniferum* due to *Helminthosporium papaveris*.)

Züchter, 1952, 22: 366-73, bibl. 22, illus.

A new method is described for the determination of the *Helminthosporium* toxin-content, in solutions of unknown concentrations, which restrains the germination and the early root development of the opium poppy (*Papaver somniferum*). The methods of obtaining the culture medium and the purification of the toxin are described. The toxin is a reversible oxidation-reduction system, of which the reduced form is toxic and the oxidized form inactive. The effect of the toxin on a number of wild *Papaver* species is described and discussed.

3259. GUNSTONE, F. D.

Vegetable oils. I. The component acids of *Strophanthus sarmentosus* seed oil. II. Further studies of seed oils of various *Strophanthus* species.

J. Sci. Food Agric., 1952, 3: 185-9, bibl. 8, and 1953, 4: 129-32, bibl. 7.

(I) The component acids of *Strophanthus sarmentosus* seed oil have been determined by the modern methods of analysis. Major component acids are palmitic (11.9%), oleic (38.3%), and linoleic (29.8%) acids; the minor components include stearic acid (9.2%), some saturated acids (4.0%) higher than stearic, and an unsaturated hydroxy acid (6.6%) not previously reported.

(II) The component acids of the seed oils of three *Strophanthus* species (*S. sarmentosus* (forest form), *S. hispidus* and *S. courmontii*) have been determined, and it is shown that 9-hydroxyoctadec-12-enoic acid is present in each seed oil. [Author's abstracts.]

3260. DIAPOULIS, C.

Le styrax en Grèce. (Styrax in Greece.) [English summary 5 lines.]

Mat. veget., 1952, 1: 119-21, 1 map.

There are two kinds of so-called styrax in Greece, *Styrax officinalis* and *Liquidambar orientalis*, their distribution being shown on a map. The resins of the former are used in European pharmacy and cosmetics.

Essential oils.

(See also 3304c, 3627d, f.)

3261. NEYBERGH, A. G.

Quelques plantes à essences dans l'Est de la Colonie. (Some essential oil plants cultivated in the east of the [Belgian Congo] Colony.) *Bull. agric. Congo belge*, 1953, 44: 1-40, 319-66, bibl. 39, illus.

The results are given of analyses, distillations, rectifications and fractionations at the OPAC Laboratory at Bukavu (formerly Costermansville) of some of the essential oils produced in eastern Belgian Congo. The plants which yielded the oils were *Eucalyptus smithii*, *E. citriodora* (oil yield 80-100 kg. per ha.), *E. dives*, *E. macarthurii*, *E. maidenii*, *E. globulus*, *Leptospermum citratum*, *Melaleuca leucadendron*, rose geranium (probably *Pelargonium radula* var. *rosodora*) (15-25 kg. per ha.), *Vetiveria zizanoides*, *Cymbopogon citratus*, *Lavandula latifolia* or *L. spica*, *Mentha piperita*, *Pogostemon patchouli*, *Ocimum suave*, *O. kilimandscharicum*, *Cupressus sempervirens* and *Anthemis nobilis*. Notes are given on methods of cultivation (particularly of rose geranium). An illustrated description is given of a simple oil-drum-and-brick still for the distillation of *Eucalyptus* and geranium oil.—Office de Produits Agricoles de Costermansville, Bukavu.

3262. HIROTA, N.
An examination of the camphor tree and its leaf oil.

Perfum. essent. Oil Rec., 1953, 44 (1): 4-10, from abstr. in *Trop. Abstr.*, 1953, 8: 194.

A new classification of camphor trees is made, dividing them into Japanese, New Zealand, Formosan West and Formosan East types. This classification is supported by differences of leaf oil and botanical characters.

3263. MARIOTTI, A.
La culture du géranium et du vétiver à la Réunion. (The cultivation of geranium and vetiver in Réunion.)
Rev. int. Prod. colon., 1953, 28: 27, 29-31, from abstr. in *Trop. Abstr.*, 1953, 8: 228-9.

Geranium and vetiver are the most important essential oil crops in Réunion. Geranium oil is produced from *Pelargonium capitatum* and *P. roseum* and vetiver oil from *Vetiveria zizanoides* and *Andropogon muricatus*. Notes are given on cultivation and oil processing.

3264. PUSSARD, R.
Première contribution à l'étude de l'influence de la chimiothérapie des plantes à parfum sur la qualité des produits utilisés en parfumerie. (A first contribution to the study of the effect of the insecticidal treatment of perfume plants on the quality of their products.)
C.R. Acad. Agric. Fr., 1953, 39: 154-6, bibl. 3.

Experiments were conducted in 1949-52 to determine the effect of insecticidal treatment of roses on perfumes manufactured from them. All the synthetic insecticidal compounds tested affected the quality of the rose perfume but the excipients used did not. Some insecticides, such as 8% BHC and 10% SPC, when applied as dusts at the usual concentration during flowering, imparted an odour which made the products useless and their effect persisted for some days. 0.5% SNP and 4% DDT dusts also imparted an odour which was, however, not so unpleasant as those of BHC and SPC and after 3 days their effect had diminished considerably.—*Agric. Zool. Stat. and Insectarium, Antibes*.

Fibres.

(See also 3657.)

3265. TABLANTE, N. B.
Abacá farming in Camarines Sur, Albay and Sorsogon [in the Philippines].
Philipp. Agric., 1951 (issued Nov. 1952), 35: 291-303, bibl. 1, illus.
The manila hemp (*Musa textilis*) industry in the Bicol region of the Philippines was studied with a view to planning improvements. Recommendations include the adoption of more scientific farming methods, mechanization of fibre extraction, co-operative marketing, a simpler grading system and the establishment of ancillary industries.

3266. TOBLER, F.
Die Verwertung der Fasern von Stämmen der essbaren Bananen. (The utilization of fibres from stems of edible bananas.) [French summary 7 lines.]
Mat. veget., 1952, 1: 113-18, bibl. 13.

Earlier experiments carried out on the author's initiative in the Cameroons and elsewhere have shown that the quality of fibres obtained from the younger (inner) leaf sheaths of edible bananas is equal to that of abaca (*Musa textilis*). Methods of fibre processing are also discussed.

3267. CUMBER, R. A.
Studies on *Oliarus atkinsoni* Myers (Hem. Cixiidae), vector of the "yellow-leaf" disease of *Phormium tenax*. Forst. III. Resistance of nymphal forms to submergence-control by inundation.
N.Z. J. Sci. Tech., Sect. B, 1953, 34: 260-6, bibl. 3, illus.

Oliarus atkinsoni is probably controlled in nature by inundation by flood waters in the vulnerable nymphal stage. The nymphs live at the base of the plant. In field trials based on laboratory experiments a complete kill of nymphs was obtained by flooding for 14 days.—D.S.I.R., Foxton.

3268. ALLISON, R. V.
Ramie, long-, strong-fibred marvel, comes to stay.
Reprint from *Fla Gr.*, Oct. 1951, pp. 2, illus.
[received 1953].

Ramie growing in Florida has had a chequered history, and it is only recently that mechanical decortication has been accomplished economically on a commercial scale. An outline is given of the latest developments in relation to varieties, planting, manuring, cultivation, chemical defoliation, harvesting, decortication, fibre yield, degumming, uses and by-products. Investigations in progress and recent improvements include mechanical planting, the treatment of stubbles that are tending to become "root bound", the use of new types of machine for harvesting, the development of a harvester-ribboner to take the place of central decorticators, the development of an in-line chemical degumming process to obviate the need for stapling, and the use of dried tops as a high grade fodder both before and after the extraction of chlorophyll, xanthophyll and carotene. Details of experiments or processes are not, however, given here.

3269. BROOK, T. R.

Soil and water conservation in sisal.

E. Afr. agric. J., 1952, 18: 79-83, illus.

A description is given of methods of co-ordinating contour planting and rail or rail-and-oxen haulage in sisal plantations to control run-off and erosion. The sisal is planted parallel to a series of "master contours" situated at such a distance apart that the rows have a gradient of not more than $1\frac{1}{2}\%$, and every alternate master contour becomes a grass strip 18 feet wide. The main and portable feeder haulage lines are located in such a way that gradients do not exceed the normal, the length of carry of the leaf cutters does not exceed 75 yards in any one direction, and the feeder lines are of the maximum length. Maps show the layout of the haulage lines for locomotives only, and for locomotives on main, and oxen on feeder, lines, in a demonstration area with slopes of up to 10%.

3270. BHATIA, I. S., SATYANARAYANA, M. N., AND SRINIVASAN, M.

Carbohydrates of *Agave vera* Cruz.

Curr. Sci., 1953, 22: 16-17, bibl. 1.

With the aid of partition chromatography it has been shown that the underwood of *Agave vera* contains a polyfructosan, 3 unidentified carbohydrates, sucrose, glucose and fructose.

3271. CZAJA, A. T.

Über den Einfluss der Düngung auf die Faserentwicklung der *Yucca*-Pflanze. (The influence of manuring on fibre development in *Yucca*.)

Mat. veget., 1952, 1: 75-106, bibl. 32, illus.

Yucca leaves harvested in the first phase of the investigation (H.A., 22: 2827) were used in a study of the influence of manuring on fibre development, from which the following conclusions are drawn: (1) Starved plants growing in a poor sandy soil had a low fibre content (17.27% of the leaf dry weight) compared with plants growing in unmanured garden soil (28.52%). (2) The latter value was depressed to 23.72% by NPK or to 21.26% by unbalanced K manuring, which resulted in a shortening of the leaf, a reduction in the number of conducting vessels and a smaller cross section of the vessels. (3) Without manuring the dry weight of the leaves attained its highest value. (4) Highest leaf yield, which was obtained from manured plants, was not associated with highest fibre yield. (5) Plants supplied with Mn gave the highest percentage dry weight, the highest fibre content per plant and the highest fibre content in relation to dry weight. (6) The breaking length of fibres from plants manured in different ways showed slight but distinct differences, the highest values being obtained from plants grown in unmanured garden soil (41.88 km.) and from plants supplied only with K (38.65 km.). Lowest values were recorded from plants grown on a lime marl soil.—Technische Hochschule, Aachen.

3272. NEPVEU, P.

Les insectes nuisibles au genêt à fibre et en particulier la pyrale du genêt. (Pests of fibre broom, with special reference to the broom pyralis.)

C.R. Acad. Agric. Fr., 1953, 39: 228-31, bibl. 9.

Spanish broom, *Spartium junceum*, grows wild over extensive areas of southern France where it is used as a fibre plant. It is also being planted on stony ground prior to afforestation. Large areas of broom are sometimes destroyed by the moth *Uresiphita gilvata*. Observations are made on the biology of the moth with suggestions for its control. The caterpillars are very resistant to insecticides, but good control has been obtained with a single application, to the second generation larvae, of 33% DDT dust or 2% SNP dust. Other minor pests of broom are mentioned.

3273. MONTAGNAC, R.

Amélioration des plantes. Kapockier. (Improvement of plants. Kapok.)

C.R. Rech. agron. Madagascar, 1952, No. 1, pp. 68-74, bibl. 13, illus.

Ceiba pentandra seed was introduced from the Far East to Madagascar by the first colonists and in 1929 seed of the indehiscent *Ceiba guinensis* \times *Ceiba thonningii* was introduced from Togo. Notes are given on subsequent selection, climatic and soil requirements, varieties, propagation (by seed, cuttings, cleft and crown grafting, and budding), choice of scions and stocks, planting out (8 \times 8 to 15 \times 15 m., or 20 \times 10 m. for permanent intercropping), pests (*Oxy hyla*, *Nomadacris septemfasciata*, *Polycleis africanus*, *Alcides convexus*, *Anoplocnemis madagascariensis*), harvesting and processing, and yields (10 kg. per tree per annum at 10-12 years old and over, compared with 1.6 kg. in Java, and 4-6 kg. in the Belgian Congo from 10 years upward).

3274. FRASSEN, C. J. H.

De levenswijze oecologie en bestrijding van de kapok-topboorder (*Alcides leeuweni* Hell.). (The biology, ecology and control of the kapok shoot-borer (*Alcides leeuweni*).) [English and Indonesian abstracts pp. 2 and 2½ respectively.]

Contr. gen. agric. Res. Stat. Bogor 132, 1952, pp. 36, bibl. 23, illus.

The kapok shoot-borer is known in Java, Sumatra and Malaya. The weevils feed on the bark of the young shoots and the larvae on the internal tissues. Observations made on an estate in central Java and in the laboratory at Bogor on the biology of the pest are reported. Other host plants are cacao, *Pterospermum acerifolium* and *Ochroma lagopus*. The adult weevils are also found on *Hibiscus tiliaceus*, *H. rosasinensis* and *Durio zibethinus*. A number of parasites are described but none is of economic importance. The development of the pest is favoured by all factors that stimulate the production of new shoots. Good control was obtained on nursery plants by painting the young shoots with a suspension of 3% bordeaux mixture and 1% lead arsenate, but this mixture may cause leaf burn. In the nursery and on young trees the larvae and pupae may be killed with a knife. Very poor control was obtained by dusting with derris, lead arsenate or pyrethrum. Spraying is impracticable. Damage can be considerably reduced by planting a given area with either a single type of kapok that has a long season in which no new shoots are produced, or with a mixture of types that have coinciding seasons of shoot production.

Hops.

(See also 2925, 2933.)

3275. KELLER, K. R.

Seed germination in hops, *Humulus lupulus* L.*Agron. J.*, 1953, 45: 146-50, bibl. 9, being *Tech. Pap. Ore. agric. Exp. Stat.* 749.

An investigation was undertaken to develop a technique for germinating hop seeds with a view to breeding varieties immune to downy mildew, *Pseudoperonospora humuli*. Some 10,000 seeds from each of 20-50 open-pollinated lines were subjected to germination tests in 1949-52. Under normal greenhouse conditions at a mean daily temperature of 68°-72° F. germination averaged only 5-10%. Chemicals (such as acids, alcohols and ethylene chlorohydrin gas), scarification, and mechanical shaking failed to stimulate germination, but seed treated at controlled temperatures for various periods in moist vermiculite germinated satisfactorily under favourable greenhouse conditions. There were significant differences between lines (due to 2 which were inherently low in their percentage germination), lengths of storage and temperature levels. Best results (85% germination) were obtained when seed was subjected to temperatures of 35°-50° F. in moist vermiculite for at least 6 weeks before sowing in a greenhouse with a mean daily temperature of 68°-72° F.

3276. THOMPSON, F. C.

The soil requirements of the hop plant. 1. A general account of the soils on which hops are grown.

THOMPSON, F. C., AND JARY, C. L.

2. The maintenance of soil structure with particular reference to the growth of hops in grass-clover leys.

A.R. Wye Coll. Dep. Hop Res. 1952, 1953, pp. 20-3, 24-33.

1. Brief notes are given on the soils of the main English hop-growing districts and on the soil requirements of some important varieties. Golding and Mathon are largely confined to the deep brick earths and loams derived from the Thanet sands in East Kent and the deep alluvial soils of the Teme valley in Worcestershire. Fuggle is tolerant of heavy soil and wet conditions but also does well on soils of good depth, texture and drainage. Evidence suggests that some of the new Wye varieties (e.g. Early Promise and the wilt-resistant OR55) will succeed on relatively wet, heavy soils.

2. The traditional methods of supplying organic matter in the form of farmyard and other organic manures, in the amounts required to maintain soil structure, are becoming uneconomic. Experimental evidence has shown that putting land down to a ley is one of the best means of building up soil structure, and preliminary trials indicate that under proper management it is possible to grow hops in grass. Where the management is such that the crop produced is equal to that from arable cultivation under comparable conditions there is a strong indication that growing under grass should be cheaper, particularly where the traditional methods of manuring with expensive fertilizers and frequent cultivations are still the practice. Finally, over a period of years, the effects of the ley should be such as to result in increasing yields on soils which have lost structure.

3277. LEGG, J. T.

The natural spread of nettlehead disease of hops.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 123-7, bibl. 9.

A statistical analysis of records for 5 years of the incidence of nettlehead virus disease of hops, the vector of which is unknown, showed that the plants immediately adjacent to infected plants were more prone to contract this disease than those more remotely situated. [Author's summary.]

3278. PAIN, J., AND LEGG, J. T.

Transmission of hop mosaic by *Phorodon humuli* (Schrank).*Nature*, 1953, 171: 263-4.

A description is given of experiments conducted in 1948-51 which showed that the spring, winged form of *Phorodon humuli*, the hop-damson aphid, is a vector of hop mosaic virus.—*East Malling Res. Stat.*

3279. PAIN, J.

Insect vector studies with mosaic and other virus diseases of the hop.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 120-2, bibl. 7, illus.

The spring migrant winged form, but not the apterae, of the hop-damson aphid, *Phorodon humuli*, and the wingless form of the potato aphid, *Macrosiphum euphorbiae*, have been shown to transmit the virus causing mosaic in hops. Both aphid species apparently also transmitted the split leaf blotch virus and a suspected virus with line-pattern symptoms. [Author's summary.]

3280. KEYWORTH, W. G.

Resistance of hop stems to invasion by *Verticillium albo-atrum*.*Nature*, 1953, 171: 656-7, bibl. 10.

Reciprocal rootstock-stem grafts were made of the resistant variety OR55 and of the susceptible variety Fuggle. The plants were infected through the new roots by infesting the soil with a virulent strain of *Verticillium albo-atrum*. When infected through Fuggle roots, both OR55 and Fuggle stems became heavily invaded and died. When infected through OR55 roots, both became lightly invaded and showed only mild leaf symptoms. In another set of experiments stems of the Fuggle variety growing on their own (healthy) roots were inoculated with a mild and a virulent race of the pathogen. When a small drop of spore suspension of either race was introduced directly into the stem xylem, both races caused only mild wilt, and grew in an attenuated fashion in the stem above the point of inoculation. A large amount of spore suspension of either race, put into a pith cavity, caused severe wilt accompanied by extensive xylem invasion. Similar tests with inoculum were made with the two races on Fuggle roots. In this case the amount of inoculum did not affect the severity of wilt or the growth of the fungus in the plant. The mild and virulent races invariably caused mild and severe wilt respectively. Hence the site of differential resistance was shown to be in the roots. The main conclusions may be widely applicable to vascular wilts, which suggests a new approach to the study of host resistance.

3281. KEYWORTH, W. G., HITCHCOCK, M. M., AND GOODE, P. M.

Verticillium wilt of the hop. VII. Further studies on wilt-resistant varieties.

A.R. East Malling Res. Stat. for 1952, 1953, A36, pp. 112-19, bibl. 8.

In further studies on wilt resistance in hop varieties since 1947 it was found that the more resistant varieties differed in relative wilt incidence from year to year and from farm to farm, probably owing to environmental factors and not to differences in pathogenicity between fungal strains. In field trials most of the new selections showed progressively less wilt in succeeding years, and the types of symptom were similar to those typical of fluctuating wilt in the Fuggle variety. None of the varieties selected to date provided an entirely satisfactory substitute for Fuggle, and breeding studies should be continued along the lines already adopted.

3282. CHATER, G. P.

A survey of hop-picking machines, 1952.

A.R. Wye Coll. Dep. Hop Res. 1952, 1953, pp. 43-58, bibl. 1.

Notes are given on a further survey of hop-picking machines conducted in 1952. The machines studied were the Bruff large (300), medium (200), type B (substantially the same as the medium), and type C; the McConnell-Hinds Plucker Bank; and a composite machine consisting of a McConnell-Hinds 1950 Flying Finger machine with the picking mechanism replaced by a horizontal type Bruff Picker. Detailed tabular statements of the performance of each machine (compared where applicable with the 1951 results) are given. The results are discussed and conclusions drawn. [See *H.A.*, 23: 941.]

3283. MACWILLIAM, I. C.

Chemistry of hop constituents. IV. The free sugars.

J. Inst. Brew., 1953, 59: 142-7, bibl. 20.

Chromatographic analysis of undried hops showed the presence of fructose, glucose, sucrose, raffinose and possibly stachyose. Quantitative estimation of the major constituents—fructose, glucose and sucrose—indicated little important difference as between varieties. [From author's summary.]—Brewing Indust. Res. Found., Nutfield, Surrey.

3284. WALKER, T. K., AND BLAKEBROUGH, N.

Changes in content of α -soft resin and of total soft resin in different varieties of hops during storage.

J. Inst. Brew., 1953, 59: 148-53.

Estimations of the resin content of 7 varieties of English hops under cold and warehouse storage were conducted in 1946, 1947 and 1948. The liability of certain varieties (e.g. Brewer's Gold) to deterioration in cold storage, as measured by loss of alpha-soft resin, at rates greater than normal was confirmed, and other cases of abnormal behaviour were noted. [From authors' summary.]—Univ. Manchester.

3285. TATCHELL, A. R.

A note on the estimation of peroxidase in hops.

A.R. Wye Coll. Dep. Hop Res. 1952, 1953, pp. 59-65, bibl. 9.

The peroxidase content increases very rapidly in green hops during the early part of the ripening period but more slowly towards its end. It decreases during drying by 56-78% according to variety. In stored hops it can apparently vary independently of the deterioration of humulone and may be affected differently by conditions of storage.

Insecticidal plants.

(See also 3204a.)

3286. BEROZA, M.

Alkaloids from *Tripterygium wilfordii* Hook. The structure of wilforine, wilfordine, wilforgine and wilfortrine.

J. Amer. chem. Soc., 1953, 75: 44-9, bibl. 15.

The insecticidal alkaloid wilfordine isolated from the roots of *T. wilfordii* has been shown to consist of a mixture of 4 ester alkaloids, designated wilforine, wilfordine, wilforgine and wilfortrine, all possessing the same polyhydroxy nucleus, $C_{15}H_{26}O_{10}$.

Rubber plants.

(See also 3304e, 3573-3592.)

3287. MOHÁCSI, T.

Az *Asclepias syriaca* gazdasági jelentősége. (The economic significance of *Asclepias syriaca*.)

Növényterm., 1952, 1: 256-63.

The cultivation of milkweed is considered uneconomical in Hungary for fibre-, rubber-, or oil-extraction, or for soil conservation as a green manure.

3288. KOŠČEEV, A. L.

Euonymus and its cultivation. [Russian.] *Priroda*, 1953, 42 (2): 97-101, illus.

Of the 16 species of *Euonymus* found in the Soviet Union 2 are considered as possible sources of gutta percha.

3289. SHAPTER, R. E.

Rubber accumulation in guayule (*Parthenium argentatum* Gray) in South Australia. *Bull. C.S.I.R.O. Aust.* 270, 1952, pp. 31, bibl. 10, illus.

Tests with guayule, *Parthenium argentatum*, begun in South Australia in 1941, have shown that the plant can be successfully grown in certain environments. It is important to use high-yielding strains with a high ratio of rubber-bearing (bark) to non-rubber-bearing (woody) tissue and rapid development of maximum rubber content. The best results were obtained in light sandy loams in the warmer districts with a moderate water supply (especially in winter) supplemented by summer irrigation. With a U.S. strain the rubber content was 4-6% at about 3 years and 9-12% at 6 years with some evidence that this is an asymptotic value. Yields in lb./acre over the whole range of environments at $6\frac{1}{2}$ years were 1,300-1,800 irrigated and 430-1,000 unirrigated.

3290. CLARK, F. E., AND OTHERS.

High-quality rubber by acetone deresination of guayule.

Industr. Engng Chem., 1953, 45: 572-6, bibl. 12.

Laboratory and pilot plant experiments are being carried out at the U.S. Natural Rubber Research Station, Salinas, Calif. A high-quality product was obtained by a simple method of deresination which is described.

3291. ANON.

Centro nacional de investigaciones agropecuarias. Instituto de botánica agrícola. (National centre of agronomic research. Institute of agricultural botany.)

Idia, 1952, 5 (59/60): 25-30.

Cultivation and improvement of Taraxacum kok saghyz (pp. 26-7). Investigations reported concern: Selection of improved varieties; the percentage of rubber in the roots is at present 10. Successful sowing tests with a modified alfalfa sowing machine. Successful mechanical extraction of rubber by the method employed for guayule [see *H.A.*, 23: 954]. Ultraviolet ray treatment of seed to increase rubber percentage of plants. Unsuccessful pre-sowing herbicide spraying with Hg cyanide and K isocyanate.

3292. JACOBSON, G.

Odlingstekniska försök med kautschukmaskros. Resultat av försök med koksagys utförda av Statens Jordbruksförsök under åren 1948-1951. (Cultural experiments with kog saghyz 1948-51.) [English summary 2 pp.]

Medd. Lanbruksh. Jordbruksf. 40, 1952, pp. 29, bibl. 15, illus.

Kok saghyz was grown experimentally in many places, under the supervision of the Swedish Agricultural Research Station, to determine soil and fertilizer requirements, optimum place in rotation, rate of sowing (from 6-8 to 12 kg./hectare, according to soil) and effective methods of weed control. On suitable soils rubber yield was found to be satisfactory, but the problem of weed control remains unsolved.

3293. DE RAFOLS, W.

Experiencias ecológicas sobre *T. kok-saghyz*, Rodin. Foto y termoperiodicidad.

I. Morfología externa. (Ecological experiments with *Taraxacum kok-saghyz*. Photo- and thermoperiodicity. I. External morphology.) [English summary 2 p.]

An. Inst. nac. Invest. agron. Madrid, 1953, 2: 1-52, bibl. 15, illus.

Growth and development of kok saghyz was studied under controlled conditions at the California Institute of Technology, Pasadena. At constant temperature under artificial light (8-hr photoperiod) optimal growth took place at 17° C. with 750 f.c. of light intensity. Plants at 26° C. and 30° C. did not survive more than 2 months. Maximum root growth occurred at 20° C. The response of plants to light intensity was measured at 20° C. day temperature and 14° C. night temperature with an 8-hr photoperiod. At a light intensity of less than 500 f.c. growth was very slow and several plants died. At 14° C. and an intensity of 750 f.c. optimum growth was obtained with a photoperiod of 16 hrs. With natural light (8-hr photoperiod) the root system made optimum growth at a night temperature between 11° and 14° C. The leaves developed best at a day temperature of 23° C., and earliest flowering (4 months

after sowing) was obtained in plants kept at 17° C. With a day temperature of 20° C. and a night temperature of 11° C., however, plants flowered 45 days after sowing. The general development of the plants was in all cases better with low night temperatures and long photoperiods.

3294. LABOURIAU, L. G.

On the latex of *Regnellidium diphyllum* Lindm. [Portuguese summary 1 p.]

Phytion, 1952, 2: 57-74, bibl. 29, illus.

It has been found that the aquatic fern *Regnellidium diphyllum* has laticiferous ducts in its rhizomes, petioles and leaves. A microscopic study of the latex is reported, details being given of the characters of the globules, nuclei, starch grains and crystals. The properties shown by the globules indicate that they consist of rubber. This is the only known instance of the occurrence of latex in a fern; the phylogenetic significance of the phenomenon is discussed. As this water plant is very easily cultivated *in vitro*, it is considered to be useful experimental material for studies on the physiology and biochemistry of latex constituents.—Bot. Gdn, Rio de Janeiro.

Seed oil plants.

(See also 3246, 3259.)

3295. SADABA, F. M.

Importancia y futuro económico del babazu. (The importance and economic future of the babazu palm.)

Bol. Oleic. Int., 1953, 3: 23-31.

The 1950 Congress of the International Association of Seed Crushers held that *Attalea orbignya speciosa*, the babazu palm of the Brazilian forests, constitutes the world's greatest reserve of oil seeds and could by itself go far towards solving the problem of the shortage of oils. The palm begins to yield at 8 and reaches full development in 10-15 years. The maximum annual yield of oil seeds per palm is estimated at 90 kg. Production is small at present but the annual potential of babazu oil is estimated at 22½ million tons.

3296. CHOUARD, P.

Problèmes nouveaux et perspectives nouvelles de la culture du ricin (une nouvelle forme de liaison entre l'agriculture et l'industrie, particulièrement pour les territoires d'outremer). (New problems and perspectives in castor bean cultivation. A new partnership between agriculture and industry, particularly in overseas territories.)

C.R. Acad. Agric. Fr., 1953, 39: 82-9.

Experience in Morocco has shown that, for perennial *Ricinus communis*, large-scale cultivation by the oil industry itself is a better method of production than small plantations. Lessons learned from 2 years' large-scale cultivation of local wild *Ricinus* are (1) the need for selection in view of the genetical heterogeneity of the seed; (2) in poor soils previously uncultivated *Ricinus* suffers from competition with weeds; (3) insect pests, especially mites and caterpillars, are a serious menace. Experiments with selected varieties in 1952 suggest that irrigated cultivation as an annual should be possible in the higher rainfall areas.

3297. DOMINGO, W. E.

The development of domestic castor bean production.

Econ. Bot., 1953, 7: 65-75, illus.

The author reviews castor bean growing in the United States, where the area occupied by the crop has increased from nil in 1947 to 84,000 acres in 1951, with an acreage of 200,000 aimed at in 1952. Shatter resistance, earliness, high yield and plant form best adapted to mechanical harvesting have been the principal, and already partly achieved, objectives in breeding. Cultural methods, engineering research and marketing methods are also discussed and the equipment used is described and illustrated.

3298. BOGDASEVSKAJA, O. V.

Formation of ricinine in castor bean plants.
[Russian.]*Doklady Akad. Nauk S.S.R.*, 1952, 82: 1001-3, bibl. 9.

Periodical analysis of growing castor bean plants has shown that high intensity of ricinine formation is characteristic of young plants or young organs (leaves), i.e. the synthesis of the alkaloid is closely correlated with the growing process.

3299. PINTO, G. P.

O óleo de uacú (*Monopterix uacu* Spruce)
Leg. pap. (Seu estudo químico.) (A chemical study of uacú oil from *Monopterix uacu*.)
[English summary ½ p.]

Bol. téc. Inst. agron. Norte, Belém, 21, 1950, pp. 31-62, bibl. 18 [received 1953].

The chemical composition of the oil from the seeds of the leguminous tree *Monopterix uacu*, found in Brazil, and its value as a cooking oil, for butter manufacture and for the production of oleic acid are dealt with. The difficulties in the way of commercial exploitation are the inaccessibility of the trees, their slow growth, the low oil content of the seeds and the dark colour of the oil.

3300. CHOPRA, G. M., AND OTHERS.

Determination of oil in oil seeds (Rapid method).

Indian J. agric. Sci., 1952, 22: 183-8, bibl. 6.

A description is given of a rapid and economical method developed by the Division of Chemistry of the Indian Agricultural Research Institute, New Delhi, for the determination of the oil content in small oil seeds and oil cake. It is claimed that for all practical purposes and especially from the breeding point of view the rapid and the conventional methods give the same results.

Sundry plants.

3301. ISTAS, J.-R., AND HONTOY, J.

Composition chimique et valeur papetière de quelques espèces de bambous récoltées au Congo belge. (Chemical composition and paper-making qualities of some species of bamboo collected in the Belgian Congo.)

Publ. Sér. tech. I.N.E.A.C. 41, 1952, pp. 23, bibl. 12.

The analyses of specimens from several species of *Sasa*, *Bambusa*, *Gigantochloa*, and *Ochlandra* growing in the Belgian Congo show that paper pulp of better quality than that obtained from the mixtures of tropical timbers used at present could be manufactured from these bamboos. The cultural and economic possibilities of establishing bamboo plantations in uncultivated savannah should therefore be examined. Notes and data are given on fibre size, preparation of material, digestion, bleaching and the chemical analysis of bleached pulp.

3302. HOWES, F. N.

The caesalpinias as tanning materials.

Mat. veget., 1952, 1: 60-74, bibl. 18.

Tanning materials obtained from the genus *Caesalpinia* are valued for special purposes. Tannin content, yield, utilization and culture of the following species are discussed: *C. coriaria*, *C. spinosa*, *C. brevifolia*, *C. digyna* and some others from South America.

3303. INGRAM, J. S.

The luffa plant and its uses.

Colon. Plant Anim. Prod., 1953, 3: 165-73, bibl. 8, illus.

An account of the loofah industry in Japan, which practically has a world monopoly, is followed by reports on loofah cultivation trials in various colonial territories. In view of the promising samples received from British Honduras, Antigua and Nyasaland, trials in these countries would seem desirable to determine whether production costs could be sufficiently lowered to compete with Japan. Brief notes are given on the essentials of loofah cultivation.

Noted.

3304.

a EDWARDS, M. G.

Rate of extraction of ground pyrethrum flowers in contact with dilute miscellae.

J. Sci. Food Agric., 1953, 4: 97-101, bibl. 1. A method believed to give complete extraction.

b GARDNER, R. G., AND MITCHELL, T. J.

Through-circulation drying of seaweed. I. *Laminaria cloustoni* stipe.*J. Sci. Food Agric.*, 1953, 4: 113-29, bibl. 24, illus.

c GUPTA, G. S., AND FAROOQ, M. O.

Essential oil of *Seseli indicum*.*Curr. Sci.*, 1953, 22: 46-7, bibl. 4.

d JAMES, W. O.

Alkaloids in plants.

Endeavour, 1953, 12: 76-9, bibl. 18.

A discussion of the part played by alkaloids in plant metabolism.

e MIHLIN, D. M., AND PŠENOVA, K. V.

The polyphenol compounds of kok-saghyz.

[Russian.]

Biohimija, 1953, 18: 24-8, bibl. 8.

Roots, leaves and latex.

f NAIR, G. V., POTI, A. N., AND PILLAY, P. P. The constituents of lacquer-bearing trees of Travancore-Cochin: Part III—Industrial utilization of the lacquering agents of *Holigarna arnottiana* Hook. and *Semecarpus travancorica* Bedd. *J. sci. industr. Res., India*, 1953, 12B: 46-8, bibl. 4. Parts I and II were noted in *H.A.*, 23: 969q and 969r.

g NOLTE, H.-W. Alte und neue Mohnschädlinge. (Old and new poppy pests.) Reprinted from *Dtsch. Landw.*, 1952, Hft. 7, pp. 4, illus. Report on work at the Aschersleben branch of the Biologische Zentralanstalt 1945-51.

h QUIMBY, M. W. *Amni visnaga* Lam.—A medicinal plant. *Econ. Bot.*, 1953, 7: 89-92, illus. Grown successfully in Massachusetts.

i ŠANTAVÝ, F. Substanzen der Herbstzeitlose und ihre Derivate. XXII. Photochemische Produkte des Colchicins und einige seiner Derivate. (Constituents of meadow saffron and their derivatives. XXII. Photochemical products of colchicine and some of its derivatives.) *Coll. Czech. chem. Commun.*, 1951 (issued 1953), 16: 665-75, bibl. 12.

j ŠANTAVÝ, F. Substanzen der Herbstzeitlose und ihre Derivate. XXVII. Beitrag zur Konstitution der Substanz F. (Constituents of meadow saffron and their derivatives. XXVII. Contribution to the constitution of substance F.) *Coll. Czech. chem. Commun.*, 1951 (issued 1953), 16: 676-88, bibl. 21.

k ŠORM, F., ZAORAL, M., AND HEROUT, V. On terpenes. XXXI. On the composition of the oil of *Matricaria chamomilla* L. *Coll. Czech. chem. Commun.*, 1951 (issued 1953), 16: 626-38, bibl. 15. Used in medicine.

l ŠORM, F., AND OTHERS. On terpenes. XXXII. A contribution to the constitution of humulene. *Coll. Czech. chem. Commun.*, 1951 (issued 1953), 16: 639-49, bibl. 14.

m SPROSTON, T., JR., AND LANE, S. Maple sap contamination and maple sap buckets. *Pamph. Vt agric. Exp. Stat.* 28, 1953, pp. 4, bibl. 4.

n WALKER, A. R. Usages pharmaceutiques des plantes spontanées du Gabon. (The medicinal uses of the wild plants of Gabon.) *Bull. Inst. Ét. Centrafr.*, 1952, 4: 181-6, from abstr. in *Trop. Abstr.*, 1953, 8: 155.

FLORICULTURE.

General.

(See also 2408, 2478, 2512, 2542, 2804, 2872, 2954, 3015, 3017, 3024, 3390h-j, 3393, 3642, 3692a.)

3305. LIPP, L. F.

Propagation with plastic.

Amer. Nurserym., 1953, 97 (6): 57-9.

A great saving of time and labour can be achieved by using the polyethylene plastic film technique, developed at the Arnold Arboretum, for the propagation of ornamental plants by cuttings. The method ensures retention of moisture in the air and proper aeration of the rooting medium. A simple propagating unit can be made by filling a seed box with equal parts of coarse sand, peat moss and Styrofoam, a light plastic that does not absorb water. The soil should be moist but not saturated. The box is shaded with cheesecloth stretched over a wire frame, and this in turn is covered with a sheet of polyethylene film that overlaps underneath the box. This film prevents the escape of moisture but permits the exchange of gases. No watering is required until the cuttings are rooted, when the polyethylene film is gradually removed. The Styrofoam in the compost then makes overwatering almost impossible.

3306. FERGUSON, C. R.

Salt tolerant plants for South Florida.

Proc. Fla St. hort. Soc. for 1952, pp. 306-13, bibl. 2.

The ecological conditions of the sea coasts of South Florida are such that few ornamental plants are able to survive. Apart from salt spray and flooding with

salt water, the unfavourable conditions include low soil fertility, high pH, wind and excessive or inadequate drainage. Some means of overcoming these problems are discussed and lists are given of ground covers, shrubs and herbaceous perennials, trees, and palms and cycads suitable for growing in this area, the relative salt tolerance of each plant being indicated.

3307. CORTVRIENDT, S. F., AND DE GROOTE, R.

Nieuwe techniek voor de experimentele studie van de minerale voeding van de sierplanten. (A new technique for studying the mineral nutrition of ornamental plants.) *Landb. Tijdschr. (Belg.)*, 1952, 5: 2, from abstr. in *Landbouwk. Tijdschr.*, 1952, 64: 810.

A description is given of frames provided with a reservoir and pressure pump installation by means of which nutrient solutions can be supplied in controlled amounts. The frames are so constructed that the plants can be grown on various media and fed with various solutions. They can be used for experimental purposes or for the commercial production of plants such as orchids.

3308. FRIESDORF.

Unterspülverfahren im gärtnerischen Pflanzenbau. (The subirrigation of pot plants.)

Tätigk. Ber. gärtn. Versuchsanst. Friesdorf/ Bad Godesberg, 1951, 23: 31-8.

In trials with *Asparagus sprengeri*, cyclamen and *Zantedeschia aethiopica* subirrigation proved superior,

both as regards yield and cost, to watering with a fertilizer solution. The method used is described.

3309. BATE-SMITH, E. C.

Colour reactions of flowers attributed to (a) flavanols and (b) carotenoid oxides.
J. exp. Bot., 1953, 4: 1-9, bibl. 10.

The petals of many white flowers, when heated with 2N hydrochloric acid, give golden-brown to red-brown colorations, attributable to catechins (yellow-brown) and leuco-anthocyanins (rose to crimson). Extracts of petals which give this reaction give a red colour with vanillin in concentrated HCl, which is consistent with the reaction being due to flavanols. With the exception of two species of Malvaceae, no flowers of herbaceous plants have given this reaction. A majority of flowers of woody plants give the reaction. The limited distribution of flavanols (supposing this identification of the chromogens to be correct) is contrasted with the universal distribution of anthocyanins. The petals of many yellow flowers, when allowed to stand in contact with 1% methanolic HCl, produce a green coloration attributable to the presence of carotenoid oxides in the petals. Flowers not giving this reaction are limited in their systematic distribution. [Author's summary].—Low Temp. Stat. for Res. in Biochem. and Biophys., Cambridge.

3310. MASTALERZ, J. W.

Packaging flowers for holding at low temperature.
Bull. N. Y. St. Flower Grs, 1953, No. 90, p. 3.

Points affecting the keeping quality of cut flowers held in cold storage at 31° F. are reviewed. Only disease-free flowers should be stored; they should not be shaded before cutting; afternoon cutting is better than morning; high temperatures previous to cutting reduce keeping quality; they should be cut at the youngest possible stage of full development; they should be packed and placed in store immediately after cutting without a hardening treatment; they should be hardened immediately upon removal from storage. Maximum holding periods at 31° F., consistent with good quality, are listed for Better Times roses, pompon chrysanthemums, carnations, snapdragons, standard chrysanthemums, tulips, narcissi and lilies of the valley.

3311. GRUENHAGEN, R. H.

Dowfume MC-2 for healthier gardens, seed beds and ornamentals.
Down to Earth, 1953, 8 (4): 10-11, illus.

Laboratory and field tests were conducted with the fumigant, Dowfume MC-2 (98% methyl bromide and 2% chloropicrin). In the laboratory it was found to be lethal to *Alternaria solani*, *A. cucumerium*, *Phomopsis citri*, *Gloeosporium phomooides*, *Cladosporium herbarium*, *Penicillium citrinum*, *Pythium debaryanum*, *Sclerotinia fructicola* and *Rhizoctonia solani* at 2 lb. per cu. ft. for 24 hours at 80° F. In a field test a plot covered with a polyethylene film was fumigated at 1 lb. per 100 sq. ft. and seeded 48 hours after the film was removed; at midseason the plants in the treated plot were strong and healthy and there was no cutworm damage or weed growth, whereas in the control there was much damping-off and root rot and considerable cutworm damage and weed infestation.

3312. OSSIANILSSON, F.

Bladlöss i växthus än en gång. (The hibernation of aphids in the greenhouse.)
Växtskyddsnotiser, 1952, No. 4, pp. 53-7.

Of 16 glasshouse installations examined in western Skåne, Sweden, in April, 1952, 12 were found to contain aphids. *Myzus persici* was encountered in 5 places, one of which showed a severe infestation on carnations. On the basis of this and earlier findings the author concludes that under Swedish conditions the green peach aphid may hibernate on ornamentals in glasshouses in sufficient numbers to constitute a danger to beets and potatoes.

3313. VINOT, M., AND BOUSCARY, A.

Les abris vitrés dans la région méridionale. (Glasshouse structures in the south of France.)
Rev. hort. Paris, 1953, 125: 851-4, bibl. 6, illus.

Improvements that could be made in the glasshouses of the flower-producing region of the south of France are discussed. In particular, methods of heating, orientation, structure and building materials are considered.

Annual and herbaceous plants.

(See also 3390c, e, q, t, 3643, 3652.)

3314. VENKATAKRISHNAIAH, N. S.

Blight of *Amaranthus paniculatus* L. caused by alternaria.
Phytopathology, 1952, 42: 668-9, bibl. 3, illus.

Flowers and leaves of *Amaranthus paniculatus*, an ornamental plant also cultivated as a food crop in India, were found blighted by *Alternaria* sp. at Bangalore. Infected flowers on the central spike were black and appeared as though affected by smut. Spots on the leaves were circular and brownish to dark brown. Lesions on the stem were irregular in shape, slightly depressed, and dark. The name *Alternaria amaranthi* comb. nov. is proposed for the fungus.—Mysore Agric. Dep., Bangalore.

3315. TARJAN, A. C.

Pathogenic behavior of certain root-knot nematodes, *Meloidogyne* spp., on snapdragon, *Antirrhinum majus*.
Phytopathology, 1952, 42: 637-41, bibl. 18.

Plants of the common snapdragon, *Antirrhinum majus*, infected experimentally by *Meloidogyne arenaria* and *M. javanica*, formed smaller root systems than plants infected by other species of *Meloidogyne*. The root-knot index rating for *M. arenaria*-infected plants, however, was higher than that for *M. javanica*-infected plants.—Plant Ind. Stat., Beltsville, Md.

3316. TARJAN, A. C.

Comparative studies of some root-knot nematodes infecting the common snapdragon, *Antirrhinum majus* L.
Phytopathology, 1952, 42: 641-4, bibl. 11, illus.

A study of the life history of 4 species and 1 variety of *Meloidogyne* infecting the snapdragon variety Margaret failed to reveal any outstanding differences between species. Infection of tomato roots by the second

generation larvae occurred 57 days after inoculation for *M. incognita*, 59 days for *M. incognita* var. *acrita*, and 63 days for *M. arenaria*, *M. hapla* and *M. javanica*.—Plant Ind. Stat., Beltsville, Md.

3317. WELLENSIEK, S. J.

De bloeifactoren van *Campanula medium*. (Flowering factors in *Campanula medium*.) *Vakbl. Bloemist.*, 1951, 6: 139, from abstr. in *Meded. LandbHoogesch. Wageningen*, 1952, 52: 15a.

Results of experiments with *Campanula medium* show that the short-day effect does not occur at low temperatures. Low temperature alone can lead to flower formation, but the duration of treatment at 5° C. must be longer than the minimum duration of short-day treatment. Plants will not flower when given short-day treatment and high temperatures. After such treatment flower buds will only be formed in long days.

3318. BEACH, G.

Plot technique with carnations.

Proc. Amer. Soc. hort. Sci., 1952, 60: 479-86, bibl. 4, illus., being *Sci. Ser. Pap. Colo. agric. Exp. Stat.* 389.

A study was made in a greenhouse on 2 carnation varieties to evaluate uniformity data taken in 2 years from the yields of individual plants, combined into plots of various sizes and shapes, to determine a statistically reliable size and shape of plot for yield studies. The results showed, among other things, that the coefficient of variability for one variety was considerably, though uniformly, higher than for the other. Total variance from all sources was lowest when both blocks and plots ran across the benches, while variance due to plots was lowest, and to blocks was highest, when both blocks and plots ran along the benches, but residual error was similar however blocks and plots were arranged in relation to the benches.

3319. SAREJANNI, J. A.

Un phytophtora du collet des oeillets. (A phytophtora collar rot of carnations.) *Ann. Inst. phytopath. Benaki*, 1952, 6: 32-6, bibl. 11.

A disease of carnations is reported from Greece which causes a wet rot or canker at the collar, a greying of the leaves or a yellowing of the leaves and stems. Cuttings as well as plants in the field are affected. The causal fungus was identified as *Phytophtora parasitica* Dastur var. *macrospora* Ashby. Infected plants should be destroyed and the irrigation water should be disinfected with copper sulphate. Cuttings should only be taken from healthy plants and should be dipped in bordeaux mixture containing 0.8% copper sulphate. Infected propagating soil should be disinfected with steam.

3320. BROOKS, J. H., III.

Chrysanthemums become an important cut flower crop in Florida.

Proc. Fla St. hort. Soc. for 1952, pp. 299-306.

The special photoperiodic, temperature and cultural requirements for the production of chrysanthemums all the year round in Florida are discussed, together with mention of some of the problems of production in that state.

3321. VINCE, D.

Delayed blooming of midseason and late-flowering chrysanthemums.

Agriculture, Lond., 1953, 60: 68-73, illus.

Results with several varieties at Reading have shown that the application of supplementary irradiation to delay the blooming of late-flowering chrysanthemums is a practical proposition for the timing of certain varieties for the Christmas market. The varieties which have been most successfully treated are Friendly Rival, Imperial Pink, Late Delight, Margaret Vinent, Mollie Nicolson and Yellow Paine. So far, no midseason varieties have been delayed until the Christmas market. It is suggested that for varieties flowering normally between the end of November and early December, a four-week lighting treatment from about 16 August to 13 September should be effective in delaying flowering in the south of England until the third week in December. The use of lighting to delay the production of buds means that the plants can be housed and the flowers allowed to open under warmer conditions than would normally be applied if delay in blooming by lowering the temperature is attempted. This results in better quality flower production. The use of temperature control to regulate the speed of opening of the flowers can be superimposed on the lighting treatment. The temperature at which the plants are kept after housing is important, since at low temperatures buds will fail to develop even in short days. The house temperature should therefore be maintained at 50-60° F. until the buds are well developed. [Author's summary.]—University of Reading.

3322. OKADA, M.

Studies on the crown bud of chrysanthemums.

IV. On retardation of blooming by long day conditions after flower bud differentiation. [Japanese.]

J. hort. Ass. Japan, 1951, 20: 33-6, bibl. 4.

To determine what length of short day conditioning after flower bud differentiation is necessary to ensure flowering on transference from short to long day conditions, 2 autumn chrysanthemum varieties were first submitted to short day conditions for 16 to 49 days after flower bud differentiation and then grown under long day conditions, viz. electric lamp illumination all night, until the beginning of November. Many of the plants submitted to short day conditions for less than 20 days failed to come into bloom when transferred to long day conditions, whereas all those submitted to short day conditions for more than 30 days after flower bud differentiation later flowered. Plants submitted to short day conditions for less than 40 days were later in flowering, but those submitted for longer than 40 days showed no such tendency under subsequent long day conditions. In the capitula of the plants submitted to short days for longer than 16 days the development of the flower bud was retarded, disc-flowers decreased and peduncles became subsequently elongated.

Y.A.

3323. SCARAMUZZI, G.

Intorno ad una malattia virus-simile della cineraria. (A virus-like disease of cineraria.)

Not. Mal. Piante, 1952, No. 21, pp. 61-4, bibl. 7.

Notes are given on a disease resembling mosaic and

streak which was observed on *Cineraria cruenta* in Pavia Botanic Garden in 1952. Experiments in transmission by inoculation gave negative results.—Lab. critogram. ital. Pavia.

3324. EXCELL, A. W., AND HILLCOAT, D.

A new species of *Delphinium* from Bhutan.
J. roy. hort. Soc., 1953, 78: 181-5, illus.

A description is given of *Delphinium muscosum* sp. nov., a little alpine species, with notes on its cultivation as a rock garden plant.

3325. LIHNELL, D.

“Vittoppighet” hos *Tagetes*. (“White top” in marigold.)
Växtskyddsnotiser, 1952, No. 4, pp. 59-61, illus.

In the summers of 1948 and 1952 the marigold fields of the Swedish Plant Protection Institute contained many plants lacking chlorophyll in varying degrees. Practically all white plants were of varieties belonging to the *Tagetes erecta* type, while no symptoms occurred in varieties of the *patula* group. Ruling out pathogens as the cause of the trouble the author discusses possible relationships between temperature and incidence of the malady.

3326. IWAI, S., AND IWAMA, S.

Flower forcing of stocks (*Matthiola incana* R. Br.) by raising seedlings in cool regions of high altitude. [Japanese, with English summary ½ p.]

J. hort. Ass. Japan, 1953, 21: 216-24, bibl. 10.

Flower bud differentiation and development studies were conducted on stocks grown at high altitudes in different temperatures. Imperfect flowers result if seedlings are moved to higher temperatures before flower bud differentiation is complete. Seedlings should therefore be grown for 35-40 days below 30° C. High-altitude seedlings flower 30 days ahead of low-altitude ones. Length of flower stalk is correlated with size of seedling at time of flower bud differentiation; to ensure stalks long enough for cut flowers sowing should occur 50-60 days ahead of the time of flower cluster differentiation. For cut flowers for Christmas, sowing should take place in mid-July at 700-800 m. altitude and the seedlings should be moved to warmer areas or conditions early in October.

3327. BÖHM, O.

Die Veilchengallmücke—ein für Österreich neuer Zierpflanzenschädling. (The violet gall midge—a new pest of ornamental plants in Austria.)

Pflanzenarzt, 1952, 5 (10): 5-6, from abstr. in
Z. PflKrankh., 1953, 60: 204.

Perrisia affinis occurred on violets near Vienna and was controlled by DDT dust applied during the flight period. There was no difference in plant susceptibility to the pest in shaded or sunny positions, as has been reported elsewhere.

3328. CALVINO, E. M.

Zinnie di ieri e zinnie di oggi. (Zinnias of yesterday and to-day.)

Ital. agric., 1952, 89: 683-9, bibl. 6, illus.

The development of the modern cultivated zinnia from the original wild species is traced and short notes are

given on genetics and colouring, cultivation and diseases.—Staz. sper. Floricolt., Sanremo.

Bulbs, tubers, etc.

(See also 3390b, r, s, 3648.)

3329. ALLINGTON, P.

Dutch bulb growing.

Typed Dissertation*, Nottingham Univ., 1952, pp. 51, bibl. 11.

This very informative degree thesis deserves much wider publicity than it is likely to get in its present neat, typed, bound but unpublished form. The author, a student of the University of Nottingham Department of Horticulture, Sutton Bonington, made excellent use of a 4-month visit to Holland from January to May, 1952, arranged as part of his course. He visited growers' holdings, and discussed problems with bulb advisory and research workers and read as much as a very limited knowledge of Dutch allowed. The result is a useful synopsis of Dutch bulb growing which cannot fail to help thoughtful English bulb growers who read it. The history of the industry is briefly delineated. Its organization is described as touching areas, holdings, the community, trading, communications, education and research. Under growing conditions the author considers climate, soils and other environmental factors. A long and useful section is devoted to cultural methods and nearly as much to diseases and their practical control. The author's observations back his conclusions which, perhaps over briefly, might be summarized as follows: The secret of the success of the Dutch bulb industry lies in hard facts, namely diligence and the application of shrewdness, intelligence and patience to the job.

3330. OOSTENBRINK, M., AND STOFMEEL, W. J.

Ontsmetting van bloembollen tegen *Heterodera rostochiensis*. (The treatment of bulbs against *Heterodera rostochiensis*.) [English summary ½ p.]

Tijdschr. PLZiekt., 1953, 59: 1-8, bibl. 2.

Certain mercury preparations which are regularly used as dips in controlling fungus diseases of bulbs proved also to be effective against eelworm. With one of these preparations, Aaventa, there was complete kill of *H. rostochiensis* using ¼% for 6 hours, ½% for 3 hours and 1% for 1 hour. These lethal doses had no adverse effect on the germination and productive capacity of the bulbs tested except for the tulip variety Red Emperor. Another mercury preparation, Aabulba, gave even better results.

3331. WOODVILLE, H. C.

Damage to anemones by field mice.

Plant Path., 1953, 2: 21-4, bibl. 5.

A description is given of attacks by rodents, chiefly the wood mouse, *Apodemus sylvaticus sylvaticus*, on anemones grown for cut flowers in Devon and Cornwall. Trapping is ineffective; and so is poison baiting owing to the wide range of *Apodemus*. Good control is obtainable with half-inch mesh wire-netting dug in at the bottom and curved over and down at the top.—N.A.A.S., Bristol.

* Following a B.Sc. Horticulture Course. Copies of this are available on loan in the libraries of the School of Agriculture, Sutton Bonington, Loughborough, and of the Bureau.

3332. ANDRÉN, F.

Besprutningsförsök mot begoniämjöldagg.
(A spraying trial for the control of begonia mildew.)

Växtskyddsnotiser, 1952, No. 4, pp. 57-9, illus.

In a spraying trial carried out in the autumn of 1951 1% FD-oil [no further details] gave better control of begonia mildew than 6 other chemicals. This preparation proved also very successful against mildew of roses and other ornamentals.

3333. CARRA, P.

Culture de glaieul. (Gladiolus culture.)
Rev. hort. Algér., 1953, 57: 83-95.

Three years' data (1950-52) are tabulated for 23 gladiolus varieties on: (1) the number of days from planting the corms, approximately on 15 January, to the opening of the first flower; (2) the percentage of inflorescences per corms planted (mean value 91.52); (3) the percentage of corms that flower a second time (mean value 83); and (4) characters of the inflorescence. The paper covers the first phase of an investigation carried out at the Jardin d'Essai du Hamma.

3334. FRY, P. R.

Two virus diseases of gladiolus.

N.Z. J. Sci. Tech., Sect. A, 1953, 34: 460-4, bibl. 9, illus.

Evidence is presented to show that a legume virus which is widespread in gladioli in New Zealand is the same as that occurring in the United States of America. The virus recovered from New Zealand grown gladioli is identified as pea mosaic virus. Cucumber-mosaic virus was recorded from gladioli showing white blotching of flower colour. White blotching was reproduced by artificial inoculation. [Author's summary.]—Plant Disease Div., D.S.I.R., Auckland.

3335. BERKELEY, G. H.

Some viruses affecting gladiolus.

Phytopathology, 1953, 43: 111-15, bibl. 11, illus.

Bean yellow mosaic virus, strains A, B, and C of tobacco ring-spot virus and cucumber mosaic virus have been isolated from gladiolus. Their symptoms there are described.—Lab. Plant. Path., St Catharines, Ontario.

3336. BALD, J. G.

Control of disease by heat-curing and dipping gladiolus corms. I. Wound periderm and the extension of lesions. II. Incidence of lesions.

III. Dipping trials.

Phytopathology, 1953, 43: 141-5, bibl. 6, illus.; 146-50, bibl. 7, illus.; 151-5, bibl. 5.

Dipping in fungicide before planting has not given consistent results in the control of corm-borne diseases in gladiolus in southern California. Studies were made of the interactions involved.

I. A description is given of experiments in which corms were cured at temperatures between 40° and 95° F. to determine the effect of different treatments on the periderm and cuticle, the corms' natural barriers against fungal infection. A programme for large-scale commercial curing framed in the light of these studies consists of curing machine-dug corms at 95° F. for a week in a curing chamber with fan-circulated air, humidity around the corms being maintained at over

80%; cleaning and grading by machine; dusting with arasan or sperton; and return to the chamber at 95° F. for a further 5-8 days; the corms should then be stored at 40° F.

II. Studies on *Fusarium oxysporum* f. *gladioli*, *Botrytis gladiolorum*, *Sclerotinia gladioli*, *Rhizoctonia solani*, *Penicillium* spp., and the root mite, *Rhizoglyphus rhizophagus* on gladiolus are discussed.

III. Dipping trials were conducted with corms that had been subjected to one of four curing treatments. Four principal dipping treatments of 30 minutes were given: (1) control; (2) lysol at 2 qts. per 100 gal. water; (3) ferbam at 2 lb. per 100 gal. water; and (4) lysol plus ferbam. The effects of lysol and ferbam appear to be largely additive and as the interaction of their effects is negligible they should therefore be more effective in combination than singly. Injury by the mercurial dip, New Improved Ceresan (ethyl mercury phosphate) was prevented by previous curing.

It is concluded that a combination of curing and dipping in efficient fungicides appears to be a necessary routine measure for the control of corm-borne diseases.—Univ. Calif., Los Angeles.

3337. LIMBER, D. P.

Watch for signs of smut fungus, a threat to gladiolus culture.

Flor. Exch., 1953, 120 (13): 7, bibl. 1, illus.

A brief description, accompanied by photographic illustrations, is given of gladiolus smut, *Urocystis gladiolicola* [=gladioli, see H.A., 22: 1740] intercepted at ports and observed in California in 1950. It appears that the disease is more troublesome on the small species such as *Gladiolus nanus* and *G. byzantinus*, due probably to less care being taken in the growing and grading of commercial varieties.

3338. BACHMANN, F.

Problematik der Thripsbekämpfung an Gladiolen durch Behandlung der Knollen.

(Problems of thrips control on gladiolus corms.)

Schweiz. Gärtnerz., 1953, Vol. 56, No. 6, pp. 3.

In May, 1952, gladiolus corms, which microscopic examination proved to be free from thrips, were planted in a soil infested with *Taeniothrips atratus*. All plants were severely attacked by 21 July, while another lot of corms infested in the previous season, but treated with HCN or Gesafid, remained healthy.—Wädenswil.

3339. KIRK, E. B.

Iris.

Nat. hort. Mag., 1953, 32: 85-95, illus.

In this entertaining and informative article the history and symbolism of the iris are traced from the Bronze Age onwards and mention is made of its numerous uses in herbalism and perfumery.

3340. HARTSEMA, A. M., AND LUYTEN, I.

Snelle bloei van Hollandse irissen var. Imperator. IVA. Invloed van temperatuur en licht. (Early flowering of Dutch irises var. Imperator. IVA. The effect of temperature and light.) [English summary 1½ p.]

Proc. kon. ned. Akad. Wetensch. Ser. C, 1953, 56: 81-105, bibl. 9, illus., being Meded. Lab. plantenphysiol. Onderz., Wageningen 108.

A method of inducing prolific flowering in Imperator Dutch irises by the second half of February, consisting of pre-planting heat treatment at 23-28° C. for 4-5 weeks, was recommended by the authors in 1940 [see *H.A.*, 16: 395]. Trials carried out over the last 12 years have shown that the method did not always give satisfactory results, and it was thought that failure in some years might be due to poor light conditions. Experiments showed that 90-100% flowering was obtained only when the total amount of light during the last 40-50 days before flowering exceeded 60 cal./cm.²/day. Flowering percentage could be increased by giving supplementary light from TL-tubes during this period. Mercury lamps (HO 2000, 500 watt) could also be used to supplement daylight, provided the visible and not the total radiation was the same as that of the TL-tubes. In most years supplementary TL-light or Hg-light (about 1,500 μ watt/sphere-unit), used to extend the daily period of light to 16 hours, was sufficient for good flowering. Iris Imperator could also be grown entirely in artificial light, if this amounted to 3,600 μ watt/sphere-unit (i.e. about 5,000 Lux for 16 hours a day).

3341. OKADA, M.

Propagation studies on Easter lily bulbs. I. Correlation between growth and bulblet production. [Japanese.]

J. hort. Ass. Japan, 1951, 20: 125-8, bibl. 11, illus.

To propagate Easter lily bulbs the bulblets produced on the underground basal portion of stem are chiefly used. Trials were arranged to ascertain the relation between the growth of mother bulbs and the production of bulblets. The results showed that there is a significant negative correlation between the weight of mother bulb and the number of bulblets produced. Y.A.

3342. OKADA, M.

On propagation of *Lilium longiflorum*. II. Bulb division. [Japanese.]

J. hort. Ass. Japan, 1952, 20: 209-14, bibl. 10, illus.

Experiments were carried out on the occurrence of bulb splitting in Easter lily. When bulblets, 1-year-old bulbs, and 2-year-old bulbs were planted, about 10% of the bulbs produced were split, but the occurrence of bulb splitting increased to more than 20% when bulbs older than 2 years were planted. It was found that more than 30% of the bulbs planted on 1 December had formed a growing crown for a new bulb by the beginning of January and all the bulbs had formed growing crowns for new bulbs by the beginning of April. Experiments in which bulbs of the same size were planted at the same time in plots of different temperature showed that most bulb splitting occurred in the coolest plot. Y.A.

3343. OKADA, M.

On propagation of *Lilium longiflorum*. III. Effects of low temperature on bulb division. [Japanese.]

J. hort. Ass. Japan, 1952, 20: 215-18.

In plots where Easter lily bulbs were submitted, before new bulbs had differentiated, to low temperatures of 0-8° C., it was found that subsequent submission to low temperature resulted in increased bulb splitting and that most splitting occurred when the formation of the

growing point for the new bulb was retarded by low temperature. In plots where low temperature was introduced after the new bulb had been differentiated, bulb splitting was not increased by low temperature treatment.

Y.A.

3344. SEELEY, J. G., AND VELAZQUEZ, D. DE C.

The effect of fertilizer applications on leaf burn and growth of Croft lilies.

Proc. Amer. Soc. hort. Sci., 1952, 60: 459-72, bibl. 12, illus., being *Pap. J. Ser. Pa agric. Exp. Stat.* 1713.

Croft lily [*Lilium longiflorum*] bulbs from 6 sources were grown in soil with various fertilizer treatments. The amount of leaf burn decreased when nitrogen fertilizers were mixed into a low nutrient potting soil or applied during forcing. Leaf burn was completely eliminated by some of the nitrogen fertilizer treatments. The soil pH decreased from 6.6 at the start to 4.5-4.9 at the end of some of nitrogen treatments which eliminated leaf burn. This shows that in this soil a low soil pH did not cause leaf burn. Applications of boron and magnesium solutions increased the amount of leaf scorch. Plants receiving fertilizer applications during forcing tended to be shorter than similar plants not receiving subsequent fertilization. The fertilizer treatments had little or no effect on the number of flowers and time of flowering. [Authors' summary.]

3345. STUART, N. W., SKOU, W., AND KIPLINGER, D. C.

Further studies on causes and control of leaf scorch of Croft Easter lily.

Proc. Amer. Soc. hort. Sci., 1952, 60: 434-8, bibl. 4.

The results of experiments at Beltsville, Maryland, and Columbus, Ohio, lend support to the theory that leaf scorch of Croft Easter lilies is due to unbalanced nutrition. It appears to be most severe in very acid soils and can be largely overcome by raising the soil pH with heavy dressings of Ca. In less acid soils the addition of N alone often tended to reduce the amount of scorch, but the reason for this is uncertain. It is not yet clear whether scorch is due to toxic amounts of Al or Mn in acid soil or to deficiencies of Ca or Mg that usually occur in such soils, or to a combination of these conditions.

3346. STRUCKMEYER, B. E.

The effect of maleic hydrazide on the anatomical structure of Croft Easter lilies.

Amer. J. Bot., 1953, 40: 25-9, bibl. 10, illus.

Plants of Croft Easter lily (*Lilium longiflorum*) showed an inhibition of growth and a failure to differentiate flower buds after treatment with 0.2% maleic hydrazide. Leaves of treated plants were thicker as a result of somewhat larger cell size, looser arrangement of the spongy parenchyma cells and larger intercellular spaces. The phloem elements of the vascular bundles of both stems and leaves were commonly found to be in varying stages of collapse. A disintegration of the chloroplasts in the palisade cells was common. The membranes of the chloroplasts were broken and particles were dispersed throughout the cell. The greater diameter of stems of treated plants can in part be explained by an increase in size of the cortical cells.—Dep. Hort., Univ. Wisconsin, Madison.

3347. WIDMER, R. E.

Cleaning of Easter lily foliage.

Minn. St. Floricul. Bull., 1 Feb., 1953, pp. 8-9, from abstr. in *Bull. N. Y. St. Flower Grs.*, 1953, No. 90, p. 4.

Easter lilies were sprayed with "Flora-Glow" at different ages of the buds to remove lime deposits and make them more saleable. Creole and Crofts were not injured and the desired results were obtained when plants were sprayed before the buds were showing. Crofts could be sprayed when the largest buds were one inch long. Bud splitting occurred in both types when sprayed after buds were larger. If sprayed just before the buds opened, 30% of the Croft buds and 48% of the Creoles split.

3348. GIANFAGNA, A.

Para-dichlorobenzene controls botrytis on lily blooms at low temperature.

Bull. N. Y. St. Flower Grs., 1953, No. 90, pp. 1-2, bibl. 5, illus.

Brown sunken lesions appeared on the buds of Croft, Creole, Floridii and Erabu lilies held in cold store at 31° F. for 2 weeks. The disease was found to be due to the presence of *Botrytis* spores on the blooms prior to cutting, which germinated in cold storage. Several methods of control were tested, but the only successful method proved to be the use of para-dichlorobenzene (PDB) flakes in the storage container. It is recommended that 5-10 g. PDB flakes be used per 23-litre container, the flakes being laid on 2 layers of cheesecloth and tied into a sack which is attached to the inside of the container cover. In preliminary tests with other cut flowers, it was found that carnations and antirrhinums were quite tolerant of large quantities of PDB in the container at 31° or 40° F. but not at 70° F. Roses, asters, gladioli and pompom chrysanthemums, however, were not tolerant.

3349. LUYTEN, I., AND VAN WAVEREN, J. M.

De orgaanvorming van *Galanthus nivalis* L. (Organ formation in *Galanthus nivalis* L.) [English summary 4 pp.] *Meded. LandbHoogesch. Wageningen*, 1952, 52: 105-28, bibl. 24, illus.

Detailed observations are recorded on the time of initiation and development of the flower and other organs in the snowdrop. It is considered that the growth is sympodial.

3350. VERGEER, T.

Blooming of *Tulipa chrysanthra* after delay in planting.

Bot. Gaz., 1952, 114: 252, illus.

Of 6 *T. chrysanthra* bulbs which had been delayed in transit from November to August, 3 had each produced one new offset within the old hulls and the other 3 had each produced two new offsets. When planted out the following November, 8 of the 9 plants bloomed and appeared as good as if they had not been delayed a year in planting.—Hope Coll., Holland, Mich.

3351. WOOD, W. M. L.

Thermonasty in tulip and crocus flowers.

J. exp. Bot., 1953, 4: 65-77, bibl. 17.

The literature on thermonasty (the opening of flowers in sunlight) is reviewed and experiments on tulip and crocus flowers are reported which confirm the theory

that thermonastic movements are due to different growth rates of the inner and outer surfaces of the perianth members. The mesophyll cells are chiefly concerned, those on the outer surface having a temperature optimum for growth about 10° C. lower than those on the inner surface. The percentage elongation of complete tepals is shown to be greater than that of separate tissue strips of either inner or outer surfaces. This difference is shown to result from the change in internal CO₂ concentration. Increasing the CO₂ concentration causes a marked cell extension and a lowering of the temperature optimum for growth. This effect appears to be closely related to respiration.—Southampton Univ.

3352. PAPE, H.

Spritzversuche zur Bekämpfung des "Tulpenfeuers" (*Botrytis tulipae* [Lib.] Hopk.).

(Spray trials for the control of tulip fire.)

Jber. biol. Bundesanst. Braunschweig 1951, 1952, p. 64.

While all the 5 proprietary copper-free organic fungicides applied against botrytis blight of tulips reduced infection, the 2 Dutch preparations Liroferm and Aafertis were superior to the 3 German materials Fuklasin, Pomarsol and Nirit.

Lawns.

(See also 3390a, g, w.)

3353. ELLIOTT, H. G.

Lawns, their establishment and management.

J. Agric. W. Aust., 1952, 1 (n.s.): 749-60.

Good lawns can be made on most soils in Western Australia but summer irrigation is generally required. Notes are given on the establishment and management of home lawns, tennis courts, bowling greens and sports grounds. The commonest home lawn grasses are buffalo, couch and Kikuyu. For tennis courts couch is the only satisfactory main base. It is also used for bowling greens but requires more frequent application of fertilizers. For sports grounds a mixture of couch grass and suckling clover is recommended.

3354. GRAU, F. V.

Better grasses for better lawns.

Flower Grower, March 1952, condensed in *Brooklyn bot. Gdn Rec.*, 1952/53, 8: 279-81, illus.

Notes are given on the characters and management of some new, improved strains of blue grass, bermuda grass, zoysia, fescue and bent grasses for lawns.

3355. ANON.

New machinery [for sports turf management].

J. Sports Turf Res. Inst., 1952, 8: 182-3, illus.

Notes are given on tractor-mounted equipment for sports turf management, and attachments for the Allen scythe. The former include piercing equipment with various types of tines, 12-foot rakes, and brushes (the 2 last articulated so that the outer sections can be raised to a vertical position for passage through gates), all for use with 3-point hydraulic linkage. The Allen-Sisis Turfman outfit consists of an Allen scythe and the following attachments: spiking unit and case for transportation, 3 styles of rake, roller, dragbrush, and set of 8 disc knives.

3356. SMITH, J. D.

A patch disease of sports turf caused by *Ophiobolus graminis* var. *avenae* E. M. Turner. *J. Sports Turf Res. Inst.*, 1952, 8: 140-3, bibl. 15, illus.

The disease is generally found on medium to light soils and so far has only been noted on turf containing a high proportion of *Agrostis tenuis*, *A. stolonifera* or *Poa annua*. Small bleached or bronzed patches of turf a few inches across are the first symptom. These grow in size, the grass plants in their centre dying and being replaced by weeds. Round the edge of the patch the diseased grass appears as a bleached ring. The method of control recommended is the removal of the diseased turf and a safe margin all round it, and either the re-turfing or the soiling and resowing of the bare area; where this procedure is not convenient improvement can sometimes be achieved by watering the affected area with a proprietary mercurial at 2 oz. in 6 gal. to 40 sq. yds.

3357. SHENEFELT, R. D.

Residual effect of chlordane on crabgrass when applied to lawn for control of sod webworm. *J. econ. Ent.*, 1952, 45: 895, bibl. 1.

Sprays of both DDT and chlordane (at 10 lb. actual chlordane per acre) gave very good control of a sod webworm, *Crambus* sp., infesting lawns in central Wisconsin, and, in addition, the chlordane treatment inhibited the development of crabgrass for at least 2 seasons without affecting the lawn grasses. [See also *H.A.*, 22: 1488.]

3358. MACNAY, C. G.

Ants and their control in Canada.

Processed Publ. Div. Ent., Dep. Agric., Ottawa, 124, 1953, pp. 7.

Chlordane in the form of dusts, wettable powders or emulsions is recommended for the control of ant colonies outdoors. If a lawn, golf or bowling green is generally infested, a thorough treatment of the entire area will produce the best results, and should last throughout the season.

Orchids.

(See also 3390m, p.)

3359. FENNELL, T. A., Jr.

Common sense vs. tradition in orchid culture.

Proc. Fla St. hort. Soc. for 1952, pp. 293-5.

Some new trends in orchid growing in the subtropical states of America are discussed, which are replacing traditional methods imported from England.

3360. KOSUGI, K.

Effects of soil moisture and low temperature upon flower bud differentiation in *Dendrobium nobile*. [Japanese, with English summary 1 p.]

J. hort. Ass. Japan, 1952, 21: 179-82, bibl. 12, illus.

The effects of soil moisture and temperature on flower bud differentiation in the orchid, *Dendrobium nobile*, were investigated in Hodogaya, Yokohama, in 1951-52. Four treatments were applied to groups of pot plants: high temperature/dry, high temperature/wet, low temperature/dry, low temperature/wet. There was no

difference between the dry and wet low temperature groups in dates of flower bud differentiation and flowering and in total buds including flower buds on the pseudobulbs. In both the high temperature groups no flower bud differentiation took place.

3361. BESS, H. A.

Cattleya wasp damages collections.

Hawaii Fm Sci., 1953, 1 (5): 3, 6, illus.

The wasp *Eurytoma orchidearum* has begun to be a serious pest of cattleya in Hawaii. Removal of infested shoots and the application of well atomized DDT sprays at 7-10 day intervals are recommended. When no more enlarged shoots appear, spraying at one month intervals will be sufficient for protection. The insect and the injuries it causes are described.

Roses.

(See also 3264.)

3362. ASEN, S., AND DAVIDSON, O. W.

Boron requirement of greenhouse roses.

Proc. Amer. Soc. hort. Sci., 1952, 60: 439-48, bibl. 9.

Flower production as well as quality was markedly affected by various B treatments. Under normal conditions the optimum value was 0.25 p.p.m. of available B in the substrate. High-salt concentrations, high-Ca concentrations, and root injury had the effect of decreasing the amount of B in rose tissue. By contrast, high-K concentrations and low-salt concentrations had the effect of increasing the B concentration of the tissue. Results of a survey determining the B status of rose plants grown in greenhouses throughout the United States indicated that the additions of B to rose soils, in amounts adequate to offset losses by leaching and plant growth, is warranted. [From authors' summary.]—Rutgers Univ., New Brunswick, N.J.

3363. MAROGER, M.

Étude de dépréisements de rosiers des forceries de la Brie. (A study of declines in greenhouse roses at Brie.)

Ann. agron. Sér. A, 1952, 3: 548-9.

Some roses grown in greenhouses at Brie for the production of cut flowers showed chlorosis and low yields when 10-15 years old. Steam sterilization of the soil sometimes gave good results but in some cases only for a year. Foliar diagnosis showed Mn deficiency (48 p.p.m. Mn in the chlorotic compared with 135 p.p.m. in healthy leaves), and petiolar injection of 0.025% Mn sulphate cleared the chlorosis in half the leaf blade, though a foliage spray of 0.25% Mn sulphate had no effect. Other cases of chlorosis confined to apical leaves were due to Fe deficiency and petiolar injection of 0.025% Fe sulphate cleared the chlorosis from the leaves.

Other trees and shrubs.

(See also 3390k.)

3364. DAVIES, V. C.

The Banks lecture, 1952. New Zealand trees and shrubs useful to man.

N.Z. Gdnr., 1952, 8: 613-23, 697-9.

Some 89% of New Zealand trees and shrubs are found

nowhere else in the world. All but 5 are evergreen, whereas in Great Britain all but 5 of the native species are deciduous. Short descriptions are given of about 30 species, including some climbers and tree ferns, with notes on their uses, mainly by the Maoris.

3365. GEORGE, E. J.

Tree and shrub species for the northern Great Plains.

Circ. U.S. Dep. Agric. 912, 1953, pp. 46, bibl. 2, illus.

The testing of trees and shrubs has been in progress at Mandan, North Dakota, since 1913. The severe climatic conditions encountered, the soil type and methods of testing are described briefly. Notes given on the many species tested include data on survival, winter injury, height and spread, growth response under dry and irrigated conditions and suitability for windbreaks, wild-life cover or as ornamentals.

3366. DORAN, W. L.

Effect of treating cuttings of woody plants with both a root-inducing substance and a fungicide.

Proc. Amer. Soc. hort. Sci., 1952, 60: 487-91, bibl. 3, being *Contr. Mass. agric. Exp. Stat.* 837.

The rooting of cuttings of woody plants, including several conifers and species of *Cotoneaster*, *Daphne*, *Ilex*, *Magnolia* and *Rhododendron*, was improved by *Phygon XL* (50% 2,3-dichloro-1,4-naphthoquinone) when applied undiluted or variously diluted with talc, or an indolebutyric acid (IBA) powder, or with water. Where *Phygon XL* was used in conjunction with IBA and in a few cases with NAA, the percentage rooting was generally greater than when the root-inducing substances were used alone. *Phygon XL* had no unfavourable effects on the subsequent growth of rooted cuttings.

3367. SAMANTHARAI, B., AND MISRA, G.

Hormone induced rooting in isolated leaves.

Sci. and Cult., 1953, 18: 388-9, bibl. 1.

When the petioles of detached leaves of *Lantana camara* were dipped for 24 hrs in aqueous solutions of IBA ranging from 2.5 to 50 p.p.m., and were subsequently grown in tap water, 70% or more of them produced roots. Without hormone treatment only 10% rooted and with 100 p.p.m. IBA all the leaves rotted. Leaves of *Congea tormentosa* similarly treated only showed from 5 to 10% rooting and then only following treatment with IBA at 20 to 100 p.p.m.

3368. WELLS, J. S.

Importance of juvenility.

Amer. Nurserym., 1953, 97 (5): 14, 87-9, illus.

Magnolia soulangeana is mentioned as an example of a plant in which cuttings taken from soft terminal shoots of vigorous nursery stock rooted much more readily and more strongly than cuttings from old-established trees. Among certain conifers juvenile forms root more easily than intermediate forms and intermediate forms than adult. The practice of growing some stock plants under glass to improve the rooting ability of cuttings from these is also mentioned with special reference to maples.

3369. STEVENSON, G. B.

Bacterial symbiosis in some New Zealand plants.

Ann. Bot. Lond., 1953, 17: 343-5, bibl. 4, illus.

A large number of species of *Coprosma* (Rubiaceae) show bacteria-containing stipular nodules. Hairs which contain bacteria are also present. In other species, for example *Myoporum laetum*, bacteria are present in superficial and in immersed leaf-glands. It is suggested that the bacterial symbionts, which can readily be obtained in culture, may function in the fixation of atmospheric nitrogen and thereby be of importance to the plants when growing in nitrogen-deficient soils. [Author's abstract.]

3370. MARDEN, D. H.

Some common noninfectious diseases of shade and ornamental trees in New England.

Proc. 28th nat. Shade Tree Conf. 1952, pp. 73-9, bibl. 7.

The following disorders are discussed briefly: leaf scorch, blight of white pine, drought and frost injuries, storm damage, construction work damage, salt and gas injuries, spray burn, and nutritional deficiencies.

3371. HAMILTON, C. C.

Spider mite control with new miticides.

Flor. Exch., 1953, 120 (16): 11, 49.

In trials during the past 3 summers Ovotran, Aramite, Geigy 338, Dimite, Chemite, and EPN-300 gave good control of different species of mite attacking nursery stock including azaleas, ilex, juniper, thuja and boxwood.—Rutgers Univ., N.J.

3372. SUSINI, E.

Le Apocynaceae ornamentals. (The apocynaceous ornamentals.)

Riv. Ortoflorofruttic. Ital., 1953, 32: 7, illus.

Notes are given on the cultivation of *Nerium oleander*, *Vinca major*, *V. rosea*, *Trachelospermum jasminoides* and *Apocynum androsaemifolium*. Numerous varieties of oleander are listed.

3373. WELLS, J. S.

Chlorosis in azaleas.

Amer. Nurserym., 1953, 97 (7): 12, 74-5, illus.

Of the 7 foliage sprays applied to chlorotic *Azalea hinodegiri* growing in nursery rows, sequestrene, a new organic form of iron, at 2 oz. per 3 gal. of water gave the best results. All the plants turned a bright, fresh green and resumed active growth. The material used at the rate of 1 oz. per 3 gal. for watering azaleas in greenhouses also cured chlorosis.

3374. KRJUKOVA, L. N.

Artificial propagation of *Buxus sempervirens* by shoots. [Russian.]

Bot. Zhurnal, 1952, 37 (1): 65-6, bibl. 2, illus.

Hardwood cuttings of *B. sempervirens* produced a stronger root system than semi-hardwood and softwood cuttings taken from the same plants. Shading of all types of cuttings was found important, and insufficient shading resulted in total loss of a batch of softwood cuttings. The better provision of woody shoots by means of nutrients is discussed.

3375. MC ELWEE, E. W.

The influence of photoperiod on the vegetative and reproductive growth of the common camellia.

Proc. Amer. Soc. hort. Sci., 1952, 60: 473-8, bibl. 6, being *J. Pap. Miss. agric. Exp. Stat.* 266.

Two camellia varieties were subjected to long and short photoperiods (13½ and 9 hrs) from 25 January to 16 July, 1950, and to the same or reversed photoperiods from 16 July, 1950, to 23 March, 1951, making 4 treatments LL, LS, SL and SS. LL resulted in significantly more normal flowers (43%) than LS (30%), SL (9%) and SS (0%). Abscised flower buds or flowers were also greater with LL (22%) than with LS (14%) and SL (2%). Shoot growth was greatest with LL and LS, i.e. when the long photoperiod coincided with the time of maximum vegetative growth. It would appear that the influence of photoperiod on flowering in camellia is first a regulatory or hormonal effect on the initiation of flower buds, and is followed by a nutritional effect in increased photosynthetic capacity arising from increased vegetative growth. The influence of photoperiod on vegetative growth appears to be hormonal. Studies on the effect of light intensity are to be reported later.

3376. RUEHLE, G. D.

Grafted casuarina trees for use as wind-breaks or ornamentals.

Proc. Fla St. hort. Soc. for 1952, pp. 199-201, illus., being *J. Ser. Fla agric. Exp. Stat.* 105.

By grafting *Casuarina lepidophloia*, which has dense upright branches, onto a stock of *C. equisetifolia*, which has a non-suckering root system, a combination would be produced that might be more suitable for both windbreak and ornamental purposes than either ungrafted species. The method of grafting is described.

3377. PEASE, R. W.

Growing flowering dogwood from softwood cuttings.

Nat. hort. Mag., 1953, 32: 71-3, bibl. 1.

A brief review of previous work shows that softwood cuttings of flowering dogwood root most readily when taken immediately after flowering and when treated with indolebutyric acid. An experiment carried out in 1952 at the University of West Virginia showed that cuttings from young seedlings made better growth after rooting than cuttings from mature grafted trees but that rooting percentages were satisfactory in both cases. Suitable treatment for the cuttings during the first season is described.

3378. JENKINS, A. E., MILLER, J. H., AND HEPTING, G. H.

Spot anthracnose and other leaf and petal spot of flowering dogwood.

Nat. hort. Mag., 1953, 32: 57-69, bibl. 9, illus.

During the last few years spot anthracnose of dogwood [*Cornus florida*] has caused serious concern in the eastern states of America. The fungus, *Elsinoë corni*, causes necrotic spots on the coloured bracts, leaves, stems and fruits. An account is given of the discovery of the disease, its range, importance and symptoms.

Notes are also given on 4 other diseases of dogwood (*Botrytis* petal blight, *Ascochyta* leaf spot and blight, *Septoria* leaf spot and *Cercospora* leaf spot) that cause spotting of flowers or foliage and might in certain stages be confused with spot anthracnose.

3379. COX, R. S., AND HEUBERGER, J. W.

Control of spot anthracnose and septoria leaf spot of flowering dogwood.

Nat. hort. Mag., 1953, 32: 70.

On the basis of experiments carried out under nursery conditions in Delaware the following control measures are recommended for *Elsinoë corni* and *Septoria floridæ* on flowering dogwood: apply either Orthocide 406 (2 lb. in 100 gal. water) or Manzate (1½ lb. in 100 gal. water) as soon as the flowers begin to open in spring, and repeat the application at monthly intervals until flower buds are formed in the autumn.

3380. HAGERUP, E., AND HAGERUP, O.

Thrips pollination of *Erica tetralix*.

New Phytol., 1953, 52: 1-7, bibl. 5.

Notes are given on the pollination by *Taeniothrips ericae* and *Frankliniella intonsa* of *Erica tetralix*, which is also pollinated autogamously.

3381. LINK, C. B., AND SHANKS, J. B.

Experiments on fertilizer levels for greenhouse hydrangeas.

Proc. Amer. Soc. hort. Sci., 1952, 60: 449-58, bibl. 5, being *J. Pap. Md agric. Exp. Stat. (Dep. Hort.) A359*.

In a continuation of previous studies [see *H.A.*, 21: 3904 and 22: 2908] shaded and unshaded rooted cuttings of the variety Europa received 3 levels each of N, P and K during the growing period, and plants of Merveille were used in 2 experiments during the forcing period, the one involving 28 different fertilizer ratios and the other different forms of N. The results were as follows: *Summer growing period*: The main response was to N, which, with increasing levels, resulted in faster development and earlier flowering at forcing time. High N also produced more summer flowers and more poor quality plants at the time of bloom. Reducing light intensity had detrimental effects. *Forcing period*: N resulted in more pink flowers and P produced pinker flowers only when N had been applied. K produced bluer flowers. Large dressings of N resulted in dark green leaves, the effect being more rapid with ammonium- and urea-N than with nitrate-N. For the soil under study the best fertilizer ratios for forcing hydrangeas, considering size, leaf colour and pink flower colour were: 30-10-5, 25-15-5, 25-10-10, 20-20-5, 20-15-10 and 15-25-5.

3382. WELLS, J. S.

The propagation of American holly.

Amer. Nurserym., 1951, 94 (4): 12-13, illus. [received 1953].

Recent experience has shown that all varieties of *Ilex opaca* can be propagated very successfully from cuttings. These are propagated in late summer in frames, or during the winter in glasshouses. The base of the stem should be wounded and treated with Merck's No. 2 or No. 3 hormone powder. Details of the methods are given.

3383. ROSSE, EARL OF.

Magnolias on lime.

J. roy. hort. Soc., 1953, 78: 102-4.

A note is given on the performance, generally very satisfactory, of a range of *Magnolia* species grown on a soil very high in available calcium. An analysis of the soil is given, and it is suggested that the success of the magnolias was due to the very low potassium content.

3384. DUVERNAY, J.-M.

Notes sur les oléacées rustiques. Le genre *Forsythia* Vahl. (Notes on the hardy Oleaceae. The genus *Forsythia*.)*Rev. hort. Paris*, 1953, 125: 830-5, bibl. 1, illus.

Following a botanical key distinguishing the principal genera of Oleaceae, notes are given on the individual species and varieties of *Forsythia*, with botanical drawings of the leaves.

3385. VEEN, B.

Het vermeerderen van *Robinia pseudoacacia* L. (Propagation of *Robinia pseud-acacia*.)
Ned. Bosbouw Tijdschr., 1951, 23 (16): 169-74, from abstr. in *Meded. LandbHoogesch. Wageningen*, 1952, 52 (Referaten): 24a.

From trials with 2 strains of false acacia it is concluded that the best method of propagation is by root cuttings. Where sufficient material is available the cuttings should not be thinner than 5 mm., but if necessary they may be as little as 2 mm. thick. The optimum length has not been determined, but 10 cm. is provisionally recommended.

3386. SIMINOVITCH, D., AND BRIGGS, D. R.

Studies on the chemistry of the living bark of the black locust in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue.

Plant Physiol., 1953, 28: 15-34, bibl. 11, being *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* 2844.

The validity of the use of plasmolysis and desiccation tests for estimating the resistance of the bark tissue of the black locust [*Robinia pseud-acacia*] to injury by extracellular freezing has been examined and established by comparing such tests with actual freezing tests performed under natural and standardized laboratory conditions. Considerations based on published evidence concerning the mechanism of freezing and freezing injury in plants, and on the results of the correlation studies described, are presented in a discussion to serve as a guide to the testing of frost hardiness of plants in the laboratory in general. Special emphasis is accorded to the usefulness and the advantage of dehydration tests for this purpose. [Authors' summary. For earlier papers in this series see *H.A.*, 19: 3330.]

3387. WELLS, J. S.

Variations in propagation procedure.

Amer. Nurserym., 1953, 97 (3): 13, 51-3, illus.

An example is given showing how departure from the accepted practice in propagation may lead to improved results. Arbor-vitae, *Thuja pyramidalis*, cuttings taken early in February were bundled, after treatment with

Mercks No. 3 powder hormone, packed upright in flats in moist sphagnum moss and stored in a cellar for 6 weeks. An occasional sprinkling with water and a moderate amount of light during the day from a 200-watt bulb were all the attention given. When the method was first adopted the cuttings were inserted in greenhouses for about a month, but this was found unnecessary, and now they are planted straight from store into closed frames. They receive careful attention during the first 4-6 weeks during which they root, and they develop into vigorous plantlets by the end of the season.

3388. FABRICATORE, J. A.

Alterazioni su foglie di *Trachelospermum (Rhynchospermum) jasminoides* Lem. (A leaf abnormality in *Trachelospermum jasminoides*.) [English summary 8 lines.]*Boll. Staz. Pat. veg. Roma*, 1951 (issued 1953), 9: 13-16, bibl. 4, illus.

Notes are given on a leaf abnormality in the ornamental climber, *Trachelospermum jasminoides*, caused by *Sphaeropsis* sp. The symptoms are irregular, depressed, ashy grey patches and they bear a superficial resemblance to hail damage.

3389. JANAKI AMMAL, E. K.

Chromosomes and the species problem in the genus *Viburnum*.*Curr. Sci.*, 1953, 22: 4-6, bibl. 7, map.

The relationship between chromosome numbers and the geographical origin of *Viburnum* species is discussed. The distribution of high polyploids in the Sino-Himalayan region indicates this to be an area of high evolutionary activity among species of this genus.

Noted.

3390.

a BAIR, R. A.

What grass to plant where.

Proc. Fla St. hort. Soc. for 1952, pp. 295-9. For lawns in Florida.

b BEAUMONT, A.

Diseases of lily of the valley.

Gdnrs' Chron., 1953, 133: 104.

c BEAUMONT, A.

Primula diseases.

Gdnrs' Chron., 1953, 133: 131-2.

d BELJSKAJA, T. N.

Gloxiniyas. [Russian.]

Priroda, 1953, 42 (2): 104-7, illus.

Mainly on propagation and varieties popular in Russia.

e DEERING, R. B., AND BROOKS, F. A.

Landscaping for summer shade.

Calif. Agric., 1953, 7 (5): 11, illus.

On the cooling influence of plants on house temperatures.

f DÉMÉTRIADÈS, S. D.

Un parasite nouveau du gardenia (A new disease of gardenias.)

Ann. Inst. phytopath. Benaki, 1950, 4: 11-13, illus. [received 1953].*Microdiplodia gardeniae* n. sp.

g ESCRITT, J. R.
Tennis court management at some leading clubs.
J. Sports Turf Res. Inst., 1952, 8: 173-7.

h FOSSUM, M. T.
Marketing information for commercial ornamental horticulture. Preliminary report.
[Publ.] *U.S. Dep. Agric. Bur. agric. Econ.*, 1952, pp. 21.
Tabulated data for the U.S.A.

i FOSSUM, M. T.
Marketing information for commercial floriculture. Preliminary report.
[Publ.] *U.S. Dep. Agric. Bur. agric. Econ.*, 1952, pp. 21.
Tabulated data for the U.S.A.

j FRIESDORF.
Sortenbereinigung und Kulturversuche.
(Variety and cultural trials with flowers.)
Tätigk. Ber. gärtn. Versuchsanst. Friesdorf/ Bad Godesberg, 1951, 23: 38-64, illus.
Variety trials with lily, hydrangea, pelargonium, begonia and gladiolus; and forcing trials with tulips.

k GARDNER, C. A.
Trees of Western Australia. No. 13. The coral-flowered gum (*Eucalyptus torquata* Luehm.). No. 14. The lemon-flowered gum *E. woodwardii* Maiden.). No. 15. The white mallee (*E. erythronema* Turcz.).
J. Agric. W. Aust., 1953, 2: 65-71, illus.
Three species of *Eucalyptus* recommended as ornamentals.

l HAMILTON, C. C.
Toxicity of new insecticides to trees.
Amer. Nurserym., 1951, 94 (4): 15, 67-9 [received 1953].
Including shade trees, ornamentals and nursery stock.

m HEATH, E. D.
Subterranean orchids in New Zealand.
N.Z. Gdnr., 1951, 8: 27-9, illus.
A new saprophytic *Corybas* sp., growing and flowering below ground.

n HOFFMANN, U.
Blütenbiologische Untersuchungen an verschiedenen *Lathyrus*arten. (Investigations on the floral biology of various *Lathyrus* species.)
Angew. Bot., 1952, 26: 239-55, bibl. 17, illus.
Lathyrus tingitanus, *L. cicera* and 3 varieties of *L. sativus* were studied.

o HUGENTOBLER, H.
Zierwert der Wildgräser. (The ornamental value of the wild grasses.)
Schweiz. Gärtnz., 1953, Vol. 56, No. 12, pp. 4, illus.
Grass species suitable for garden planting are described.

p KLINKOWSKI, M.
Viruskrankheiten der Orchideen. (Virus diseases of orchids.)
Reprinted from *Gartenwelt*, 1952, Vol. 52, No. 11, pp. 2, bibl. 16, illus.

q LIN, H. T.
Notes on the genus *Viola* in Taiwan.
Taiwania, 1950, 1: 269-83, bibl. extensive [received 1953].

r MAGIE, R. O., AND COWPERTHWAITE, W. G.
Progress in gladiolus research.
Proc. Fla St. hort. Soc. for 1952, pp. 263-6.
At the Gulf Coast Experiment Station, Florida.

s VAN DER MEER, K.
De bodemkartering van Nederland, Deel XI. De bloembollenstreek. (Soil survey of Holland. Part XI. The bulb district.) [English summary 5½ pp.]
Versl. Landbouwk. Onderz. 58.2, 1952, pp. 155, bibl. 143, illus., maps, fl. 7.

t OLORENSHAW, W. B.
Carnations in New Zealand.
N.Z. Gdnr., 1952, 8: 837-9 and 883-5, 887, illus.
Including propagation and outdoor culture.

u SAVONET, G.
Het stekken van cacteeën en succulenten.
(Propagating cactae and succulents by cuttings.)
Cult. Hand., 1953, 19: 157-61, illus.
Cuttings and other methods described.

v SENARATNA, J. E.
Carnivorous plants of Ceylon.
Trop. Agriculturist, 1952, 108: 162-5, illus.
Pitcher plants, sundews and bladderworts.

w SHURTLEFF, M. C.
Susceptibility of lawn grasses to brown patch (*Rhizoctonia solani*).
From abstr. in *Phytopathology*, 1953, 43: 110.

x WOLFE, H. S.
Landscaping with tropical and subtropical fruits.
Proc. Fla St. hort. Soc. for 1952, pp. 284-6.
In Florida.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(See also 2517c, 2518, 2651, 2655, 2659, 2739, 3510, 3652, 3665, 3670, 3679, 3686.)

3391. REBOUR, H.

L'arboriculture fruitière en Afrique du nord.

(Fruit tree growing in North Africa.)

Congr. pomol. Fr., 1952, being *Suppl.*

Pomol. franç., 1953, pp. 23-35.

Apart from wine grapes, cider apples and perry pears, fruit production in France and North Africa is approximately equal. Olive, citrus, date and fig together account for 85% of production in North Africa. There are 5 climatic regions. In the Mediterranean region as a whole the chief crops are citrus, almond, cactus, carob, fig, pomegranate, kaki, medlar, olive, pecan, pistachio, and vine; in the coastal area which enjoys mild winters without frost the chief crop is lemon and others are avocado, feijoa and guava; in the inland valleys (50-400 m. above sea level), which have mild winters and hot summers, the main crops are citrus, apricot, Japanese plum, and peach. In the intermediate region (400-800 m.), where winter frosts occur, the characteristic crop is peach and others are fig, olive, vine, Japanese plum, apple, pear and European plum. On the high plains (400-1,000 m.), which have a continental climate, pome fruits, cherry and European plum flourish. In the pre-Saharan zone (800 m. and over) the rainfall is irregular and the characteristic crop is apricot. In the desert zone the rainfall is highly irregular and the date is the classic fruit crop. Notes are given on these crops and on the future of the fruit growing industry. [For shorter account see *H.A.*, 23: 1510.]

3392. CEDERMAN, J. A.

Fruit growing at Kerikeri.

N.Z. J. Agric., 1953, 86: 147-54, illus.

Notes are given on fruit growing in Kerikeri district, North Island. The chief crops with average yield in bushels per tree are sweet orange (1), Meyer lemon (3), standard lemon (1½), and N.Z. grapefruit (5). Orchards are often interplanted with tree tomatoes, Chinese gooseberries and passion fruit. Many growers irrigate by overhead sprinkler.

3393. ANDERSEN, F. G.

Advisory, inspection and research work in horticulture.

Fmg S. Afr., 1952, 27: 604-8.

The following is among the research work summarized in this report of the Division of Horticulture, South Africa, for 1951/52: *Citrus*: Results to date are reported on several trials at Nelspruit and Alkmaar, namely, (1) the long-term N, P, K, Ca and manure trial on Valencia oranges now 11 years old, (2) inorganic manure vs. kraal manure superimposed on clean cultivation vs. green manuring, (3) irrigation and fertilizer, (4) cultural practices, (5) time of harvesting, (6) 28 rootstocks compared for 8 varieties and (7) the use of *Aspergillus niger* to determine citrus soil nutrient requirements, particularly P and K. Among these results mention may be made of the first record of a significant yield response to K due to increased fruit size, the effect of irrigation water placement on yields, the good yield response of trees growing in a permanent

cover of *Glycine javanica* compared with poor results obtained in permanent grass sod. *Vegetables*: In trials at Pretoria spacing cabbages 3 x 1 ft. gave the highest yield but 3 x 1½ ft. gave more acceptable heads. With tomatoes staking increased yields of marketable fruit but not total yields; close spacing of 4 x 1½ ft. gave the highest yields of both staked and unstaked plants. Onions stored well for 6 months with negligible sprouting following spraying with dilute maleic hydrazide 2 weeks before lifting. Breeding of vegetables has been expanded. *Pineapples*: At the Bathurst Pineapple Research Station mulching 2 varieties with grass reduced yields and fruit size compared with clean cultivation. Plants spaced 1 ft. apart in the rows made poor growth compared with plants spaced 18 in. or 2 ft. Autumn applications of N gave the largest number of fruits with the variety Queen and spring applications with Cayenne. *Deciduous fruits*: Variety collections have been established at Pretoria of grapes, peaches, plums and apricots. *Floriculture*: The new section has expanded rapidly.

3394. DYER, R. A.

Botany and plant pathology.

Fmg S. Afr., 1952, 27: 601-3.

The report of the Plant Pathology Section of the Division of Botany and Plant Pathology, South Africa, for 1951/52 includes: *Citrus*: Virus studies indicate the sweet orange, on its own roots or on rough lemon, to be tolerant, whereas grapefruit, even on rough lemon or sweet orange, Eureka lemon and certain tangerines, notably Natal tight-skin naartjie, are subject to decline. In Eureka lemon there appears to be a relationship between decline and susceptibility to black spot (*Phoma citricarpa*). *Avocados*: The trunk rot caused by *Phytophthora cinnamomi* can be arrested by injection with 0.15% methylene blue solution. *Tomatoes*: No variety has been found resistant to bacterial wilt, but immunity can be conferred by grafting on *Solanum torvum*. Two other immune species, *S. gilo* and *S. macranthum*, proved unsatisfactory as stocks.

3395. BYTINSKI-SALZ, H.

Two important tree borers in Israel.

FAO Plant Prot. Bull., 1952, 1: 38-9.

Short accounts are given of the life histories of, damage caused by, and recommended control measures for, *Batocera rufomaculata* which attacks mango, fig, avocado, guava, mulberry, apple, pear, etc., and *Phoracantha semipunctata* which attacks eucalyptus.

Avocados.

(See also 3507i, j.)

3396. JULIEN, J. H.

Notes on the cultivation and propagation of the avocado pear in Mauritius.

Rev. agric. Maurice, 1953, 32: 25-7, bibl. 1, illus.

The avocado thrives in Mauritius especially at lower altitudes. Many hybrids of unknown West Indian, Guatemalan and Mexican varieties are encountered. The best planting distance is 25 x 25 feet. Windbreaks and irrigation are necessary. Propagation is by grafting on 6-month-old hardy hybrid pot seedlings. At Pamplemousses (altitude 250 feet, rainfall 51 in.) the best

method is side-grafting. A 4-inch-long, mature, terminal twig with petioles attached is introduced under a T-incision in the bark of the stock 6 in. above ground. After a fortnight the stock is headed back. October is the best month. At Beau-Bassin (altitude 750 feet, rainfall 45 in.), only 11 miles away, approach grafting is the best method. A small, mature twig with the upper parts of its leaves removed and with a 2½-in. section of bark and wood removed 4 in. below the terminal bud, is introduced into the stock under bark flaps opened between 4 and 7 in. above the soil. Union is complete after 80 days and the scion is then partly severed from its parent; 10 days later it is completely severed.

3397. MALAN, E. F.

Avocado varieties.

Fmg S. Afr., 1953, 28: 31-3, illus.

Short descriptions are given of the more important varieties cultivated in South Africa, namely Fuerte, Ryan, Edranol, Itzamna, Nabal, Linda, Mayapan, Collinson and Hass. The A- and B-grouping of these and other varieties is indicated and recommendations made on the choice of varieties for different regions with particular reference to altitude.

3398. ALDRICH, D. G., COONY, J. J., AND GOULBEN, B.

Fertility trials made for avocados.

Calif. Citrogr., 1953, 38: 258-60, bibl. 8.

A leaf analysis survey of avocado groves was conducted in San Diego County, California, in December, 1951, and January, 1952, to provide a basis for establishing P and K fertilizer trials. It was virtually confined to the Fuerte variety and 50 mature spring cycle leaves were taken from the periphery of 10 random trees per grove. Fertilizer practice was found to have no significant effect on leaf P and K content when the average leaf values for these elements were high, but where there was a wide range of leaf P values or these were generally low, the lowest leaf P values were obtained when fertilization was with N alone. It also appeared that attention must be given to irrigation practices if the accumulation of harmful quantities of chlorides (which cause leaf tip burn) is to be avoided; when drainage conditions permit, enough water to leach the soil below the root zone should be applied at least once a year.—Calif. Citrus Exp. Stat.

3399. ZENTMYER, G. A.

Avocado root rot research.

Calif. Citrogr., 1953, 38: 256-7.

Investigations are being conducted at Riverside into the control of avocado root rot (*Phytophthora cinnamomi*) which, in California, occurs primarily in badly drained soils. Resistant rootstocks are being studied. Other crops for replanting infected soil. Macadamia nut, cherimoya, persimmon and citrus are resistant. Other hosts exceed one hundred. Common ones are pineapple, chestnut, pine, heather, camellia, rhododendron, azalea, cinnamon, and cinchona. Soil treatment experiments suggest that the disease decreases slightly with increase of pH from 5 to 8. Alfalfa meal tended to reduce activity. Fumigants which kill *P. cinnamomi* include chloropicrin (30-40 gal. per acre), DD (150 gal. per acre), and methyl bromide (2 lb. per 100 cu. ft.), and there are possibilities of complete control in small isolated areas. Some soil fungicides which have shown

promise in the greenhouse are receiving field tests. Irrigation. In view of the close connexion between root rot and soil moisture, preventing the accumulation of water during the winter rains is important. Occurrence in native soils. The fungus has not yet been found in virgin native soils (chiefly from San Diego Country). Suggestions for mitigating the disease in an infected grove. (1) Irrigate diseased trees (which require less water than healthy ones) individually. (2) Cut back diseased trees severely to restore top-root balance. (3) Rake in 100-200 lb. alfalfa meal experimentally under a few diseased trees. (4) Maintain a dry zone round the infected area. (5) If only a few trees are infected, eliminate them and fumigate the area thoroughly.

3400. ROGOFF, W. M.

The repellency of chlordane, DDT, and other residual insecticides to greenhouse thrips.

J. econ. Ent., 1952, 45: 1065-71, bibl. 19.

Of several residual insecticides tested on avocado leaf discs for repellency toward the avocado and citrus pest, the greenhouse thrips, *Heliothrips haemorrhoidalis*, chlordane was repellent at the lowest concentration applied. Corresponding evidence of repellency was shown for successively higher concentrations of DDT, parathion, heptachlor, and dimethyl phthalate. No significant evidence of repellency was demonstrated for γ -BHC. Degree of repellency and order of toxicity were in most cases inversely related.

3401. BARTLETT, B., AND DEBACH, P.

New natural enemies for avocado pests.

Calif. Citrogr., 1953, 38: 265, 267, bibl. 1.

Notes are given on 7 ladybird and 5 hymenopterous parasites of latania, ivy and greedy scales on avocado that have recently been introduced and on the predatory mite, *Hemisarcopes malus*, recently observed (for the first time in California) on latania scale; on predators recently introduced from Australia, South America and South Africa to combat mealy bugs, especially the long tailed mealybug *Pseudococcus adonidum*; and on predators of orangeworms, particularly the orange tortrix, *Argyrotaenia citrana*.

3402. BOYES, W. W.

The keeping quality of avocados. Effect of maturity and storage temperature.

Fmg S. Afr., 1953, 28: 103-6, bibl. 4, illus.

Storage tests were made on Fuerte, Nabal and Itzamna avocados at various temperatures ranging from 31° to 50° F. These fruits were grown in the winter-rainfall area of the western Cape Province. It was found that the best storage temperature for the Fuerte variety is 42° F., and that the riper the fruit when picked the more susceptible it is to cold injury during subsequent storage. The amount of cold injury (darkening of the skin and flesh) was in direct proportion to the storage temperature. It is recommended that the Fuerte be picked for export when showing a fat content of 15% to 17%. The Nabal variety is not sensitive to storage temperature and can be stored for 3 weeks at any temperature between 31° and 45° F.; at temperatures above 45° F. it ripens too rapidly. Tentative results for the Itzamna variety indicate that 31° F. may be the best storage temperature for this variety; this has, however, still to be confirmed. [Author's summary.]—Western Province Fruit Research Station, Stellenbosch.

3403. MUSTARD, M. J.

Effect of cold storage on some Florida avocados.

Proc. Fla St. hort. Soc. for 1952, pp. 180-6, bibl. 9, illus.

The results of this study indicate that Waldin, Trapp, Linda, and Schmidt varieties are not well adapted to refrigerated storage; whereas Booth 7, Lula, and Nabal varieties can be satisfactorily refrigerated for one week and Booth 8 and Taylor varieties for two weeks under the storage conditions investigated. [From author's summary.]—University of Miami.

3404. ANON.

Avocado oil.

Perfum. essent. Oil Rec., 1952, 43: 399-400, from abstr. in *Trop. Abstr.*, 1953, 8: 30.

An analysis of avocado oil shows that it has a high vitamin D content and contains vitamins A, B, G and E in addition to phytosterol and lecithin. It has a high digestive coefficient (93.8%) and can be used for cosmetic, therapeutic and feeding purposes.

Citrus—general.

3405. CHAPMAN, H. D.

Orange orchards in the Mediterranean countries.

Calif. Citrogr., 1953, 38: 192, 200-2.

From a tour of citrus areas in Spain, Morocco, Algeria, Tunis, Sicily, Greece and Israel the author concludes that, by comparison with California, oranges in those countries show better general tree condition and yield excellent crops of larger sized fruits. Suggested reasons for the differences in favour of Mediterranean citrus are the absence of the plough pans resulting from mechanized cultivation, basin irrigation in place of furrow irrigation, and the application of water when the trees need it instead of irrigating on a schedule. As regards fruit size, the warmer climate of the Mediterranean, possibly combined with more sunshine and higher humidity, is probably the dominant factor. More detailed observations are to be published later.

3406. ANON.

V jornadas citricolas argentinas. (The Argentine citrus-growing conference [1952].)

Idia, 1952, 5 (58): 19-21.

Papers read were: citrus nurseries (A. Banfi and H. C. Carbonell), a new late variety of sweet orange (J. E. Arroyo and H. A. Speroni), the influence of the rootstock on important biochemical factors [in the fruit] (A. Banfi and H. N. Benítez), the species of thrips injurious to citrus in Argentina (E. Tapia), the preliminary results of an ecological study of the Trypetidae of N.E. Argentina (A. Rosillo), experiments in the attraction of fruit flies with various baits (A. Rosillo), fruit fly control experiments in the Paraná delta (A. Turica), control of citrus red scale (A. P. Vergani), the behaviour of the new citrus rootstocks in relation to gummosis (V. L. E. Taboada and J. Domato) and wither tip in sweet orange (H. A. Speroni). [Abstracts of several of these appear below.]

3407. HOOS, S., AND BOLES, J. N.

Orange industry trends.*

Calif. Agric., 1953, 7 (3): 10.

Production and consumption of oranges in the U.S.A. are higher than ever before. Whereas 15 years ago 90% of the orange crop went into the fresh market, today nearly one-third of the present production goes into frozen concentrated orange juice. The resultant changes in the economic relationships of the industry in California are examined. These include changes in the relative values of navels and Valencias and in the seasonal competition between Florida and California. They compel more attention than ever to be paid to means of increasing yields in relation to outlay and of decreasing costs per volume of output.

Citrus—varieties, rootstocks and propagation.

(See also 2533, 3507a, b.)

3408. FROST, H. B.

Characteristics in the nursery of citrus budlings of young nucellar-seedling lines and parental old lines.

Proc. Amer. Soc. hort. Sci., 1952, 60: 247-54, bibl. 12, being *Pap. Calif. Citrus Exp. Stat.* 739.

In 14 out of 15 varieties of citrus, "young-line" trees, at three years of age in the second budding generation from young nucellar seedlings grown from seeds planted 13-15 years before the second budding, were markedly different from trees budded from ordinary "old-line" orchard trees of the same varieties (usually the seed parents of the seedlings). The young-line trees were, on the average, decidedly more thorny than old-line trees, and were much less productive of flowers and fruits. They were also usually larger in trunk cross section. Young-line trees from budwood taken high up in the bud-parent trees were on the average considerably less thorny than those from low budwood. Old-line trees in a similar comparison did not show this difference.

3409. IWASAKI, T., NISHIURA, M., AND AKIYAMA, H.

Studies of the strains of the Satsuma orange (second report). [Japanese, with English summary 24 pp.]

Bull. hort. Div. Tōkai-Kinki. agric. Exp. Stat., 1952, No. 1, pp. 16-33.

The results are reported of a trial of 14 varieties of Satsuma orange (*Citrus unshiu*) begun in 1938 and of another of 18 varieties begun in 1939. Silverhill has high vigour, high yield, sweet but somewhat small fruit, and is suitable for early shipping. Hayashi has good vigour and a high yield of fruit with high sugar and acid contents, and is suitable for early shipment and storage. Sugiyama has large fruits of fairly good flavour, becomes vigorous with increasing age, and is suitable for early shipping. Ishikawa shows promise for storage.

3410. CAMERON, J. W., AND SOOST, R. K.

The Kara mandarin for the late spring market.

Calif. Citrogr., 1953, 38: 120, 134-5, bibl. 4, illus.

The Kara mandarin (*Satsuma* \times *King*) was introduced in 1936. It is of the tangerine type with larger fruit than Dancy and Clementine tangerines and is of out-

* A more detailed account by the same authors, entitled "Oranges and orange products, changing economic relationships", is published as *Bull. Calif. agric. Exp. Stat.* 731. We have not yet received a copy.

standingly good eating quality. Details are given of its percentages of juice, solids and acid, and of yields, fruit sizes, rootstock behaviour and market reactions.

3411. COOK, J. A., HORANIC, G. E., AND GARDNER, F. E.

Citrus rootstock trials.

Proc. Fla St. hort. Soc. for 1952, pp. 69-77, bibl. 3, illus.

A progress report is given on the first 9 years of a large-scale citrus rootstock trial planted on typical sandy soil of the Ridge section of Florida. Valencia and Parson Brown orange varieties were budded on the following 7 seedling rootstocks: sour orange from 2 seed sources, rough lemon, Bowen grapefruit, Cleopatra mandarin, Parson Brown sweet orange, and Rusk citrange (*Poncirus trifoliata* \times *C. sinensis*). The preliminary results have confirmed that rough lemon produces vigorous, precocious trees with high yields and poor fruit quality. Sour orange stock produced stunted trees with low yields of high quality fruit. The other stocks were intermediate in both yields and quality, except that Rusk citrange produced fruit of quality equal to that from the sours and gave much higher yields than the sours.—U.S.D.A., Orlando.

3412. KEFFORD, J. F., CHANDLER, B. V., AND LYNCH, L. J.

The influence of rootstocks on the quality of canned orange juice.

Food Pres. Quart., 1952, 12: 26-9, bibl. 9.

Investigations have shown that both Washington Navel and Valencia oranges give canned juices that are free from bitterness and of outstanding quality when grown on trifoliata stocks, whereas on rough lemon stocks their juice is much inferior and on sweet orange stocks intermediate in quality.—C.S.I.R.O., Homebush, N.S.W.

3413. BANFI, A., AND BEÑATENA, H. N.

Influencia del portainjerto en algunas determinaciones fisicoquímicas de importancia. (The influence of the rootstock on important biochemical factors [in the fruit].)

From note in *Idia*, 1952, 5 (58): 19-20.

Studies were made of the fruit colour, juice colour, soluble solids, acids, vitamin C, reducing and non-reducing sugars and total sugar of the fruits of the common mandarin of *Concordia* grafted on sweet, sour and trifoliolate orange, on various limes and on Californian grapefruit. The fruit had most colour on trifoliolate orange rootstock, followed by sweet orange, Rangpur lime, common mandarin and grapefruit. The juice was most highly coloured on trifoliolate orange, followed by sweet orange, rough lemon, Rangpur lime and grapefruit. A close relationship existed between the soluble solids and non-reducing sugar contents.

3414. BUELL, E. P.

The *Citrus karna* as a root-stock for some citrus species in the wet zone.

Trop. Agriculturist, 1952, 108: 201.

Preliminary observations suggest that the so-called Karna lemon is much more resistant to waterlogging than the rough lemon (*C. jambhiri*), gives a higher percentage take when budded, especially with limes, and produces vigorous scion growth with a tendency towards early bearing.

3415. IWASAKI, T.

Investigation on seeds and seedlings of citrus.

[Japanese, with English summary 2 pp.]

Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat., 1952, No. 1, pp. 34-48, bibl. 12.

In citrus seed and seedling studies undertaken with a view to finding a better rootstock than trifoliolate orange or Yuzu the factors investigated were number of seeds per unit weight of fruit, seed size, number of embryos per seed, percentage germination, seedling survival, growth and development of seedlings in their first 2 years, uniformity of growth, and frost hardiness. It was found that: (1) trifoliolate orange had the highest seed production, percentage germination and survival rate; (2) trifoliolate orange had the second best growth rate and was followed by Natsudaidai, Yamamikan and Marumera; (3) Yuzu was slower growing than the above and had a low survival rate; (4) Tachibana, Konejime and Tōsu were rather slow growing but had a good survival rate; (5) shaddock, lemon, grapefruit, and New Summer orange showed rapid but uneven growth, and had a low survival rate owing to susceptibility to disease and frost tenderness; (6) in general, loose-skinned and sweet oranges were slow growing and frost tender and had a low survival rate.

3416. DOMATO, J.

Possibilidades de la siembra anticipada en los almácigos de citrus como medio de acelerar la producción de portainjertos. (The possibilities of early sowing in citrus nurseries as a means of hastening rootstock production.)

Idia, 1952, 5 (58): 25-6, illus.

Experiments were conducted at the Tucumán Agricultural Experiment Station in 1949 to determine the possibility of hastening the production of seedlings of transplantable size for use as rootstocks. Sowing of 2 common rootstock species, Rangpur lime and Cleopatra mandarin, began on 12 May as soon as the fruits were large enough to contain well-formed seeds and before they began to colour, and continued every week until late August, the normal sowing season. The results with Rangpur lime were: 12 May—germination complete in 83 days, 67% success; 31 May—117 days, 52%; 22 June—124 days, 54%; subsequent sowing gave better results, germination being complete earlier and giving 70% success. With Cleopatra the correlation between early sowing and slow germination was even more manifest, complete germination requiring 165 days in the first and 63 days in the last sowings. It was concluded that there is no advantage in early sowing since (1) germination is slower, lower, and more irregular than in normal sowings, and (2) by transplanting time (March) late plants have reached the same size as early ones.

3417. RICHARDS, A. V.

Viability of citrus seeds.

Trop. Agriculturist, 1952, 108: 186-8, bibl. 1.

The percentage germination of lime and sweet orange seeds declined steadily when they were kept at temperatures of 78° to 80° F. for 2 or more days after extraction. Seed sown immediately after extraction showed 88% and 76.8% germination respectively whereas after 7 days' storage germination had dropped to 54.8% and 52.4%.

3418. ERICKSON, L. C., AND DEBACH, P.

Rooting lemon cuttings with fruits attached.
Science, 1953, 117: 102-3, bibl. 9, illus.

Experiments in the rooting of lemon cuttings with fruits attached were conducted at the California Citrus Experiment Station. Light-green, silver and yellow Eureka lemons with 1-2 inch stems with and without 1-2 leaves were employed, and some cuttings were treated with 0.2% naphthaleneacetic acid. Light-green lemon cuttings rooted most readily and yellow lemon cuttings least readily. The presence of leaf tissue was necessary for rooting in yellow lemon cuttings but not in light-green or silver. Rooting was higher in treated than untreated cuttings in all comparisons. [See also note 3507f.]

Citrus—planting, environment, cultivation, irrigation.

(See also 3507d, h.)

3419. MALAN, E. F.

Planting out citrus trees.

Fmg S. Afr., 1953, 28: 15-17, and *Citrus Gr.*, 1953, No. 233, pp. 4-6.

The notes given cover choice of site, contour lay-out, spacing, planting holes, time of planting, transplanting procedure, the protection of stems against sunburn, irrigation, and subsequent care.

3420. AMIZET, L.

Contribution à l'étude de la densité des plantations commerciales modernes d'agrumes dans le département d'Alger. (A contribution to the study of planting density in modern commercial citrus plantations in the Department of Algiers.)

Fruits et Prim., 1952, 22: 481-3.

Early high yield is the important consideration in the Department of Algiers, and this can be obtained by the double or interplanting method, whereby twice the final number of trees required per ha. are planted and the excess removed after 10-15 years. In a tested method of double planting known as the Système Robert Germain, the initial spacing is 4×6 m., and the final spacing 8×6 m., or about 200 trees per ha., which experience shows to be the best density in this area. Irrigation and cultivation occur parallel with the lines in which the trees are 6 m. apart. Fullest advantage from the system is gained with alternate lines of different species or varieties (rather than mixtures in individual lines). Examples are given of combinations employed. These include early orange/late orange, Marsh Seedless grapefruit/early or late orange (except Valencia Late), Eureka lemon/late orange.

3421. MORITA, Y., AND NISHIDA, T.

Studies on physical properties of soils in relation to fruit tree growth. II. Soil atmosphere and tree growth. (6) Growth of satsuma orange, trifoliate orange and peach seedlings, and grape cuttings as influenced by various concentrations of oxygen in the soil atmosphere. [Japanese, with English summary 1 p.]

J. hort. Ass. Japan, 1953, 21: 209-15, bibl. 9, illus.

The effect of soil oxygen concentration on the growth

of satsuma orange (*Citrus unshiu*), trifoliate orange, peach seedlings and grape vine cuttings was studied. Satsuma and trifoliate orange grew vigorously at low concentrations; their shoot growth was normal at 4% or more and was interrupted at 1%. Vines grew normally at 7%. Vines and trifoliate orange died at 0.5% but satsuma orange did not. Peach seedlings declined in growth at 6% and died at just under 2%. Six years' experiments on fruit tree seedlings show that persimmon, satsuma orange, trifoliate orange and grape vine grow well, apple and Japanese pear grow moderately and peach grows poorly at low oxygen concentrations.

3422. IWASAKI, T., AND NISHIURA, M.

Influence of shading and submersion on fruit drop of citrus. [Japanese, with English summary 1 p.]

Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat., 1952, No. 1, pp. 49-60, bibl. 8.

Pot experiments on the effect of shading and submersion on fruit drop in Satsuma and Washington Navel oranges were conducted in 1943 and in 1949-50. In both varieties shading when in bloom or early in the fruiting season hastened and slightly increased fruit drop. Shading Satsuma after June drop increased fruit drop slightly. Fruit drop in Satsuma was not increased by submersion throughout the fruiting period. It is concluded that deficiency of sunlight is the cause of the low yields from the inner crown and of rainy season fruit drop.

3423. TUMANOV, I. I.

Physiology of the cold resistance of citrus plants. [Russian.]

Izv. Akad. Nauk S.S.S.R. Ser. biol., 1952, No. 5, pp. 56-84, bibl. 55, illus.

A comprehensive review of Russian work on improving the winter-hardiness of citrus. The problem is discussed under 3 main headings. 1. Control of growth as a method of influencing hardiness—deals in detail with the effect of fertilizers, mulching, spacing, training and pruning, and rootstocks. 2. Improvement of conditions of hardening—shows that citrus plants grown in light are more frost resistant than plants grown at the same temperatures under shade. Data are also given indicating that muslin covers over whole plants and whitewashing of stems and lower limbs prevent overheating during the day, and so reduce night frost damage. The breeding of hardy varieties and the use of frost resistant rootstocks are also considered in this section. 3. Frost protection by warming the plants—discusses the effects of various covers used, particularly over prostrate forms of citrus, orchard heaters and smoke producing apparatus.

3424. REBOUR, H.

Le travail du sol dans les vergers irrigués.
(Cultivation of the soil in irrigated [citrus] plantations.)

Fruits et Prim., 1953, 23: 5-7, illus.

Cultivation of the soil in irrigated citrus plantations may lead to the formation of a pan just below the cultivated horizon and thus to inadequate irrigation. Experience shows that soils remain permeable if cultivation is abandoned but non-cultivation is not recommended as a general practice. Shallower cultivation should be employed pending further experiments.

The shallower the cultivated horizon, the slower is the formation of a pan beneath the surface and the greater is the area available for root growth.

Citrus—tree composition and nutrition.

(See also 3507 l.)

3425. REITZ, H. J., AND LONG, W. T.

Mineral composition of citrus leaves from the Indian River area of Florida.

Proc. Fla. St. hort. Soc. for 1952, pp. 32-8, bibl. 13, being *J. Ser. Fla. agric. Exp. Stat.*

123.

Leaf samples were taken from 43 Valencia orange groves and 60 seedless grapefruit groves in the Indian River area of Florida, and analysed for 6 major elements. Citrus leaves from the Indian River area more closely resemble in composition leaves from the Western States than those from Interior Florida. Indian River Valencia leaves are lower in N and K but higher in Ca and Na than Interior Florida samples. Negative correlations were found between leaf Ca content and leaf contents of K, P, N, and Mg, in both Valencia orange and seedless grapefruit samples. Grapefruit leaf samples were higher in K and lower in N than Valencia orange leaf samples. Practical application of this information is discussed. [Authors' summary.]

3426. CAMERON, S. H., AND OTHERS.

Influence of age of leaf, season of growth and fruit production on the size and inorganic composition of Valencia orange leaves.

Proc. Amer. Soc. hort. Sci., 1952, 60: 42-50, bibl. 11.

Samples of leaves so marked that their exact age was known and representing three consecutive flushes of Valencia orange leaves on sweet orange rootstock at Los Angeles, California, were collected at intervals from their onset in 1944 until May of 1946. The dry weight and nutrient element composition of these leaves were compared with 15-week-old leaves representing new flushes in both an on- and an off-crop season and with leaves from Valencia orange trees grown on other rootstocks. Summer flush leaves were larger than either spring or autumn leaves and required the least time to reach maximum weight. Leaf weight fluctuated as the leaves became older. The data indicated that the leaves of the Valencia orange tree are an important storage organ for carbohydrates and some inorganic nutrients. Age of the leaf was the most important factor influencing its mineral composition. As the leaf increased in size the rapid accumulation of carbohydrates resulted in a decrease in the percentage of N, P, K, Ca, and Mg. Following this initial decrease the percentage of Ca and to a lesser extent that of Mg increased. As the leaf approached maturity the percentage of Mg again decreased. Leaf composition varied within flushes, between flushes, and between years. Factors influencing these variations besides age of the leaves include: relative number of new leaves, season of the year, blossoming and fruiting, alternate bearing habit, and climatological differences during the period of development. The Ca-K ratio of autumn leaves was very much lower than that of summer leaves. Losses of N, P, and K in leaves were noted at blossom time and just prior to their abscission. Substantial gains in leaf N and K were noted at certain

periods of the year. The rootstock influenced the changes in composition of scion leaves as they increased in age. [Authors' summary.]

3427. WALLACE, A., MUELLER, R. T., AND SQUIER, M. G.

Variability in orange leaves of the same age and collected from a single tree.

Proc. Amer. Soc. hort. Sci., 1952, 60: 51-4, bibl. 11.

Eight-month-old Valencia orange leaves of identical age ranged in per cent of N from 1.61-2.65; of P, 0.089-0.145; of K, 0.63-1.68; of Ca, 2.42-6.35; and of Mg, 0.10-0.34. The majority of the variability occurred naturally, i.e. was independent of analytical variability. A very small part of it was due to weight of leaves. Calculations were made to determine the minimum number of leaves per sample necessary to assure specified levels of precision in leaf analysis. [Authors' summary.]

3428. ANON.

Fumure azotée de printemps. (Spring application of N [to citrus].)

Action des fortes fumures azotées de printemps sur la coulure des fleurs des agrumes. (Effect of heavy spring applications of N on flower drop in citrus.)

Rapp. Cons. Exp. Rech. agron. Algér. 1951/52, 1952, pp. 31-3 and 35.

Experiments in citrus manuring are reported by the Service de l'Arboriculture. 1. In the Department of Constantine experiments demonstrated the advantage of applying N before the February-March rains. Fertilizer applied later does not take effect in time to mitigate June drop. 2. At Boufarik doubling the normal dose of N (500 g. per tree instead of 250) had no effect on the yield but increased the coefficient of variation in flower drop between trees, suggesting that the larger dose approached the level of toxicity.

3429. KUYKENDALL, J. R., AND WALLACE, A.

Urea nitrogen as foliar spray.

Calif. Agric., 1953, 7 (3): 6, illus.

When citrus seedlings and cuttings were grown in N-deficient culture solutions foliage applications of urea increased top and root growth markedly, but where sufficient N was applied to the roots foliage sprays tended to reduce growth. Urea applications to green leaves increased leaf N from about 2% to over 6% in 24 hrs, nearly all the N present being then in fractions other than urea. Concentrations of 2%, 3%, or 4% urea always caused marked tip-burn, but with 1% urea injury was slight. The addition of sugar to the spray stopped leaf-burn but also reduced N absorption. Ringing (girdling) the trees before spraying also reduced, though it did not eliminate, leaf burn. In field trials with oranges and grapefruit urea sprays had no apparent effect on fruit quality.

3430. EMBLETON, T. W., KIRKPATRICK, J. P., AND PARKER, E. R.

Visible response of phosphorus-deficient orange trees to phosphatic fertilizers, and seasonal changes in mineral constituents of leaves.

Proc. Amer. Soc. hort. Sci., 1952, 60: 55-64, bibl. 10, illus., being *Pap. Calif. Citrus Exp. Stat.* 742.

Phosphorus-deficient Valencia orange trees growing in an alluvial acid soil of low exchange capacity were stunted and had dull-green foliage which became bronzed in winter. During bloom premature abscission of older leaves was very heavy, many of these leaves having a V-shaped tip-burn. A weak spring growth flush was the only one produced. Yields were low and the fruits were late maturing and exceedingly large and coarse. In numerous fertilizer treatments, started in September, 1950, and extended in August, 1951, emphasis was placed on phosphates and lime. Responses to P as treble super at 20 lb. per tree per year and especially as liquid H_3PO_4 at 16 lb. per tree per year were rapid and included increased foliage development throughout the year, better foliage colour, increased fruit set, reduced fruit size and better fruit quality. Associated with this response was an increase in leaf P and Ca and a decrease in leaf N and K calculated as percentages of dry weights. [See also *H.A.*, 23: 1139.]

3431. SITES, J. W., AND DESZYCK, E. J.

Effect of varying amounts of potash on yield and quality of Valencia and Hamlin oranges.

Proc. Fla St. hort. Soc. for 1952, pp. 92-8, bibl. 6, being *J. Ser. Fla agric. Exp. Stat.* 125.

The effects of potash variations from 0% to 16%, in NPK fertilizer mixtures on the percent soluble solids, percent titratable acid, and ratio of the juice, as well as on the external grade, size, and yield of fruit of young Hamlin and Valencia orange trees are shown. The percentage soluble solids and ratio of the juice, as well as the incidence of creasing and percent of U.S. No. 1 grade fruit produced, were found to decrease as the rate of potash supply increased; whereas the percent titratable acid of the juice and average diameter of fruit increased as the rate of potash supply increased. The yield of fruit produced was not affected by the rate of potash supply except at the very low and high levels. [From authors' summary.]

3432. JONES, W. W., AND CREE, C. B.

Leaf potassium *vs.* fruit size in Valencia oranges.

Calif. Citrogr., 1953, 38: 174-6, bibl. 4.

Although the relations between the concentration of potassium in the Valencia orange leaves and fruit size are generally positive, the results of this study show that in the various Valencia areas the relationship is not numerically consistent. The mean value for potassium concentration in the leaves and fruit size in the different areas varies greatly. This means that each area must be considered separately and that no critical level of leaf potassium can be universally assigned to determine the value or need of potassium fertilization to increase fruit size. [Authors' summary.]—*Calif. Citrus Exp. Stat.*

3433. JONES, W. W., AND OTHERS.

Effect of sodium in fertilizer and in irrigation water on concentration in leaf and root tissues in citrus trees.

Proc. Amer. Soc. hort. Sci., 1952, 60: 65-70, bibl. 11, being *Pap. Calif. Citrus Exp. Stat.* 741.

Applications of Na in fertilizer or irrigation water increased the percentages of Na in leaf and root tissues of orange trees. The increase in Na was greater in the roots than in the leaves, and was greater in the root bark than in the root wood (xylem). In the feeder roots, the increase in Na was associated with relative decreases in concentrations of K, Ca, and Mg. Analysis of small roots of orange trees may provide a better index of Na toxicity than leaf analysis, especially if tree injury is not severe. Na concentrations in roots and leaves were rapidly reduced by the application of gypsum to the soil. [Authors' summary.]

3434. REUTHER, W., AND SMITH, P. F.

Effects of high copper content of sandy soil on growth of citrus seedlings.

Soil Sci., 1953, 75: 219-24, bibl. 9, illus.

A chlorosis suggestive of Fe deficiency has become increasingly common in Florida citrus orchards established on sandy, acid, well-drained soils. Improved foliage colour and better weed growth has often followed application of basic materials such as Ca, Mg, or Na carbonates or wood ashes. In the study described here citrus seedlings were grown in old citrus or virgin soil with different levels of Cu. From the results of this and previous work it is tentatively concluded that the level of soil Cu in many mature orchards is approaching, and in some cases has already reached, a point where chlorosis and damage to root development are likely to occur. When soil pH is under about 5.0 appreciable chlorosis developed in seedlings when total soil Cu exceeded 150 p.p.m. This chlorosis was reduced or eliminated by liming. The hypothesis is suggested that the acid-soil chlorosis is usually caused by unfavourably high concentrations of heavy metals such as Cu, Zn and Mn, but particularly Cu, in relation to available soil Fe. Further work to test this hypothesis is in progress. [See also next two abstracts.]

3435. REUTHER, W., AND SMITH, P. F.

Iron chlorosis in Florida citrus groves in relation to certain soil constituents.

Proc. Fla St. hort. Soc. for 1952, pp. 62-9, bibl. 9, illus.

Data obtained from analysis of more than 200 soil samples show that most mature Florida citrus groves have accumulated relatively high concentrations of total Cu, Mn and P in the top soil. In general groves affected with iron chlorosis have a higher level of these elements in the soil and a lower level of total Fe than healthy groves. Pot studies indicate that foliage chlorosis and abnormal root development of citrus seedlings can be induced by adding Cu to grove soil, particularly when the soil is acid, and that the Cu levels required to produce the responses are within the range found in most affected groves. Cu was found to be many times more potent in producing Fe chlorosis of the foliage and toxic effects in the roots than either Zn or Mn. The level of these 2 elements in the top soil of mature groves was on the average lower than the level of Cu. The evidence available suggests that the major factor affecting the incidence of Fe chlorosis in groves is excessive accumulation of Cu in the soil. The effect of this is intensified by low pH. It is concluded that the current practice of giving annual applications of CuO

is unsound under Florida conditions, and that regular applications of lime should be given.—U.S.D.A., Orlando.

3436. SMITH, P. F., AND SPECHT, A. W.
Heavy-metal nutrition in relation to iron chlorosis of citrus seedlings.
Proc. Fla St. hort. Soc. for 1952, pp. 101-8,
bibl. 9, illus.

Studies were made on Valencia seedlings grown in nutrient solutions for the purpose of comparing the effects of high Cu, Zn and Mn on growth and plant composition, and of determining whether the toxic effects of these metals could be overcome by applications of Fe. The results confirm earlier conclusions that the main cause of the recent increase in acid-soil chlorosis in Florida citrus groves is the accumulation of Cu in the soil. This element was found to be much more toxic than Zn or Mn and it is usually found in the soil in greater amounts. Toxicity to roots and Fe deficiency in the foliage can be caused by an excess of any of these 3 metals if the pH is low. Heavy accumulations of Zn or Mn in the living roots is accompanied by an increase of these elements in the foliage, but this is not so with Cu. Cu tends to repress the uptake of both Zn and Mn, while Mn has no similar effect on Cu and Zn. These findings also point to Cu as the cause of acid-soil chlorosis. Chelated iron appears to enter the plant readily, even through sick and distorted roots, but this material is not an antidote to excess Cu. Cu toxicity to the roots is not diminished by the iron, even though it overcomes the chlorosis of the leaves. It seems advisable to combine liming to immobilize excessive Cu with the use of chelated iron to prevent chlorosis.—U.S.D.A., Orlando, Fla., and Beltsville, Md.

3437. LEONARD, C. D., AND STEWART, I.
Correction of iron chlorosis in citrus with chelated iron.
Proc. Fla St. hort. Soc. for 1952, pp. 20-4,
bibl. 8, illus., being *J. Ser. Fla agric. Exp. Stat.* 122.

A chelate of iron with ethylenediamine tetra-acetic acid (EDTA) is presented as the first successful corrective for Fe deficiency chlorosis in citrus in the field. When applied to acid soils at the rate of only 20 grams of Fe per tree, the leaves on chlorotic citrus trees became green within six weeks. From 100 to 300 g. Fe in this chelate per tree was required to correct chlorosis on calcareous soils. Chlorotic trees which became green after treatment with the iron EDTA chelate showed a marked increase in total Fe in the leaves, as compared with chlorotic leaves from untreated trees. There was no significant change in the leaf content of N, P, K, Ca, or Mn. At this time, foliage sprays of iron EDTA chelate do not look promising for chlorotic citrus trees growing on calcareous soils, but will require further study. Chlorotic trees failed to respond to many other treatments designed to increase the uptake of Fe by the trees, including some treatments that have been successful with other crops. Polyphosphates, pyrophosphates, and hexametaphosphates, which will chelate iron, have up to now failed to correct the chlorosis. Work is continuing in an effort to find more satisfactory chelating agents for other nutrient elements

and for iron in calcareous soils. [From authors' summary. See also *H.A.*, 23: 1144 and 2170.]

3438. STEWART, I., AND LEONARD, C. D.
The cause of yellow tipping in citrus leaves.
Proc. Fla St. hort. Soc. for 1952, pp. 25-7,
bibl. 5, illus., being *J. Ser. Fla agric. Exp. Stat.* 119.

Yellow tipping of citrus leaves, which has been observed in Florida for over 20 years, has been found to be a symptom of toxicity of perchlorates that occur as impurities in fertilizers. Yellow tipping was induced by soil applications of nitrate of potash derived from Chile caliche, and by chemically pure potassium, calcium and sodium perchlorates. Chemical analysis of the leaves of treated trees showed that perchlorates are taken up in the oxidized state. A higher concentration of perchlorates was found in the leaves of the upper branches than in those of the lower. Grapefruit seedlings were found to be more sensitive to perchlorate toxicity than either Cleopatra mandarin or sweet orange.

Citrus—growth substance sprays.

3439. DAVISON, R. M.
Control of pre-harvest drop of Washington Navel oranges.
N.Z. J. Sci. Tech., Sect. A, 1952, 34: 306-12,
bibl. 9.

Aqueous sprays of 2,4-D, 2,4,5-T and MCPA at 5, 10 and 20 p.p.m. were tested for the control of preharvest drop of Washington Navel oranges in randomized block experiments with 5-8 single-tree replications at Kerikeri in 1949-51. 2,4-D and 2,4,5-T at 20 p.p.m. gave a 60-80% reduction in drop, but MCPA at the same concentration gave only 49%. A single application of 2,4-D in late autumn, before or after fruit drop had begun, reduced loss for periods up to 15 weeks, but the duration of effectiveness was much less when bordeaux or cuprox was added. With late autumn applications no leaf curling occurred.—D.S.I.R., Auckland. [See also *H.A.*, 22: 881 and 4250.]

3440. REECE, P. C., AND HORANIC, G. E.
Some varietal responses of Florida oranges to pre-harvest sprays.
Proc. Fla St. hort. Soc. for 1952, pp. 88-91,
bibl. 4.

The sodium salt of 2,4-D, diethanolamine 2,4-D, and the triethanolamine salt of 2,4,5-trichlorophenoxypropionic acid at concentrations of 25 p.p.m. significantly reduced pre-harvest drop of Pineapple oranges. There was no significant difference in the effectiveness of the 3 compounds. They did not, however, reduce pre-harvest drop of Valencia oranges under Florida conditions, in contrast to the good control of drop obtained in California with 2,4-D. Applications of 2,4-D between September and December had neither a beneficial nor a detrimental effect on Valencias but applications in late January or April significantly increased the amount of pre-harvest drop. Sprays containing 25 p.p.m. sodium salt of 2,4-D were effective in preventing about one-third of the normal pre-harvest drop of Temple oranges over a period of 2 months while the crop was maturing.—U.S.D.A., Orlando.

Citrus—diseases and pests.

(See also 2925, 3507e-g, k, m-o, r, s, 3515.)

3441. BITTERS, W. P., DUKESHIRE, N. W., AND BRUSCA, J. A.

Stem pitting and quick decline symptoms as related to rootstock combinations.

Calif. Citrogr., 1953, 38: 154, 170-1, bibl. 4, illus.

An examination was made in October, 1952, of Valencia orange trees growing on 125 different rootstocks at Baldwin Park, California. Among 2,042 trees examined, of which half had been inoculated with quick decline buds in 1948, 16% showed pitting, 14.7% on the rootstock alone, 1.7% on the Valencia trunk and 0.4% on both root and trunk. Among inoculated trees 18.1% showed pitting and among control trees 13.9%. 172 pitted trees also showed quick decline symptoms, but 154 pitted trees showed no visible symptoms of quick decline. This suggests that there is no relationship between stem pitting and the presence of top symptoms of quick decline. Among species or groups of rootstocks the highest percentages of pitted trees occurred among the trifoliolate oranges and trifoliolate hybrids and the lowest among grapefruit (contrary to Brazilian experience), mandarins and sweet oranges. There were, however, clear varietal differences within the groups.

3442. GRANT, T. J., AND SCHNEIDER, H.

Initial evidence of the presence of tristeza, or quick decline, of citrus in Florida.

Phytopathology, 1953, 43: 51-2, bibl. 7.

Under field conditions, tristeza symptoms similar to those described for the disease in other parts of the world, have been observed in Florida on the following sweet orange varieties on sour orange rootstocks: Temple, Valencia, Lue Gim Gong, and Parson Brown. The reaction to date of inoculated lime plants indicates that a mild or intermediate form of the tristeza virus rather than the more severe form is present. [See also next abstract.]

3443. GRANT, T. J.

Evidence of tristeza, or quick decline, virus in Florida.

Proc. Fla St. hort. Soc. for 1952, pp. 28-31, bibl. 16.

Experiments were carried out in Florida in 1952 to determine whether the tristeza virus of citrus was present in the state. Twigs of trees infected with various diseases of which the cause had never been satisfactorily determined were bottle-grafted onto West Indian limes. The vein-clearing and stem-pitting symptoms typical of tristeza infection developed on plants grafted with material collected from 2 widely separated areas, Ocoee and Avon Park. Further studies showed that the disease was also present in other areas. The reactions of the test lime plants indicated that only the intermediate and mild strains of the virus were present. The fact that the rate of infection in citrus groves is low indicates that only an inefficient aphid vector is present in Florida.—U.S.D.A., Orlando.

3444. DUCHARME, E. P., AND KNORR, L. C.

Comments on methods of minimizing tristeza damage.

Proc. Fla St. hort. Soc. for 1952, pp. 57-62, illus., being J. Ser. *Fla agric. Exp. Stat.* 124.

On the basis of experience gained in South America, advice is given to Florida growers on the value of various possible control measures for tristeza. Destruction of visibly infected trees, sterilization of the soil, and control of aphids are of little or no value. Inarching with tolerant stocks or inducing scion rooting will only be successful under certain conditions. The most satisfactory procedure is to interplant or replace affected trees with trees on tolerant rootstocks.

3445. HUGHES, W. A., AND LISTER, C. A.Lime dieback in the Gold Coast, a virus disease of the lime, *Citrus aurantifolia* (Christmann) Swingle.*J. hort. Sci.*, 1953, 28: 131-40, bibl. 17, illus.

A virus disease of limes in the Gold Coast [see *H.A.*, 19: 2603] is described. The disease causes gumming and hypertrophy of the xylem and impedes translocation of starch from the leaves. Grafting experiments indicated that there are 2 viruses or strains, namely "die-back" and "little leaf". Rough lemon, sour orange, Lake and Sampson tangelo when used as rootstocks, and 3 varieties of sweet orange, a tangerine and a grapefruit (all believed to be infected with tristeza), were found to be naturally infected with the lime virus. Rough lemon, lemon, Trinidad wild grapefruit, a Syrian bitter orange and *Clausena anisata* carried the lime virus without symptoms, while sour orange, citron, *Aeglopsis chevalieri*, and *Afraeglopsis paniculata* displayed symptoms. *Citropsis articulata* was killed by the virus. Infected limes, budded on rough lemon 10-15 years ago, have retained their vigour, and this stock is therefore being used in the rehabilitation of the lime industry. *Aphis citricidus* transmitted the virus after 1 hour's feeding, and the mealybug *Ferrisia virgata*, rarely found on citrus in the Gold Coast, transmitted it after 30 hours' feeding. Attempts to transmit the virus with *Aphis maidis* were unsuccessful. It is suggested that the lime die-back disease of the Gold Coast is caused by a similar virus or virus complex to that described for tristeza and stem-pitting of grapefruit in South Africa and Brazil.

3446. DAVEL, H. B.

Research in agricultural problems.

Fmg S. Afr., 1952, 27: 609-15.

A short section of this 1951/52 report of the Agricultural Research Institute, Pretoria, is devoted to fruit crops. *Citrus*: Nucellar seedlings are proving much more vigorous than older clonal material. Attempts to use mild virus strains to protect citrus against virulent strains have not so far yielded any definite results. It would appear that the tristeza virus only plays a minor role in the decline of lemon and naartje [mandarin-tangerine] varieties; this decline is not seed transmitted and would appear to be of a non-virus nature. Attempts to transmit the greening disease to susceptible varieties of naartje, sweet orange and tangelo have so far been unsuccessful; genetic factors are now being studied.

3447. KNORR, L. C.

Arrugado del tronco (rugose trunk) del limón rugoso. (Rugose trunk in rough lemon.)

Idia, 1951, 5 (58): 22-5, illus.

Notes are given on a disease of citrus trees grafted on rough lemon. Its symptoms are severe decline, thin crown, some defoliation, scaling of bark of the trunk, a deep pitting of the wood of the trunk below the graft union and of the principal roots, thinness and brittleness of principal roots, and reduced development of rootlets. It is thought to be a virus disease and is transmitted by grafting but not by insects.

3448. YAMADA, S., AND SAWAMURA, K.

Studies on the dwarf disease of Satsuma orange, *Citrus unshiu* Marcovitch. (Preliminary report.) [Japanese, with English summary 1 p.]

Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat., 1952, No. 1, pp. 61-71, bibl. 26, illus.

The dwarf disease of Satsuma orange appears to be a virus disease. Its symptoms are severe stunting, shortening of the internodes, and malformation of leaves and fruit. It was successfully transmitted by grafting but not by juice inoculation. Susceptible species and varieties are *Citrus nobilis*, Tengu-mikan, Yatsushiro, Tanikawabuntan, Tachibana and Ujukitsu.

3449. WALLACE, J. M., AND DRAKE, R. J.

New virus found in citrus.

Calif. Citrogr., 1953, 38: 180-1, illus.

A brief account is given of the symptoms of a vein-enation virus first observed on sour orange. The virus would appear to be distinct from that causing quick decline. It has been graft-transmitted to sweet orange, grapefruit, tangerine, lime, rough lemon and lemon, but attempts to transmit it through *Aphis gossypii* and by sap inoculation have so far been unsuccessful. Further studies are in progress.

3450. FORD, H. W.

The effect of spreading decline on the root distribution of citrus.

Proc. Fla St. hort. Soc. for 1952, pp. 47-50, bibl. 5, being *J. Ser. Fla agric. Exp. Stat.* 112.

Mature citrus trees affected with spreading decline were found to have about 40% fewer feeder roots than healthy trees. The decline trees have more roots in the upper 10 inches of the soil but almost none below 30 to 42 inches. In the majority of the groves examined, significant root disintegration was first found at the 20 to 25 inch level with a rapid increase in symptoms with depth. Practically all of the remaining feeder roots of decline trees from 25 to 42 inches were dark coloured and stubby. Citrus trees replanted in spreading decline soil were devoid of both lateral and feeder roots below 30 inches, indicating that the trees did not develop a normal root system at any time after planting. [Author's summary.]

3451. MARTIN, J. P., AND OTHERS.

Effect of soil fumigation on growth and chemical composition of citrus plants.

Soil Sci., 1953, 75: 137-51, bibl. 19, illus., being *Pap. Calif. Citrus Exp. Stat.* 743.

Greenhouse and field studies with several citrus species

were designed to determine whether nutritional changes produced in the soil by fumigation were reflected in the chemical composition of the plants and, if so, whether the increased plant growth following fumigation of old citrus soils might be partly explained on the basis of such changes. The fumigants used included D-D, chloropicrin, CS₂, propylene oxide and ethylene dibromide at various strengths. Fumigation of old citrus soils prior to replanting with citrus appreciably increased growth, in some cases nearly doubling it. Growth stimulation was accompanied by occasional, but not consistent, changes in the chemical composition of the plants. Citrus seedlings grown in old citrus and in non-citrus soils had similar compositions. All plants contained adequate amounts of most nutrient elements normally found in healthy citrus plants. Such changes in composition as occurred were repeated in plants grown in fumigated, non-citrus soils but without any accompanying increase in growth. It is concluded that in the old citrus soils investigated changes in nutrient status following fumigation did not account for the increased growth of citrus replants and that this growth stimulation was probably due to the destruction of parasitic and perhaps other detrimental organisms.

3452. SINGH, M. P., AND SINGH, R. P.

Studies on dying-back in citrus.

Indian J. Hort., 1953, 10 (1): 1-8, bibl. 20.

A description is given of a survey undertaken in the citrus orchard at the Fruit Research Station, Saharanpur, U.P., to determine the incidence of dieback. The overall incidence was 39%. Mandarin and sweet orange were more seriously affected than grapefruit and pummelo. The cause appeared to be exanthema due to copper deficiency.

3453. SPERONI, H. A.

El cabito seco de los naranjos dulces. (Wither tip in sweet orange.)

From abstr. in *Idia*, 1952, 5 (58): 21.

The presence of *Colletotrichum gloeosporioides* has been observed in sweet orange suffering from wither tip, but attempts to reproduce the disease have failed. Nutritional deficiency and leaving over-mature fruit on the tree are considered to favour the condition. In a varietal trial on different rootstocks in the Bella Vista district the only variety affected was the common orange.

3454. BRUN, J.

La fonte des semis de bigaradiers (*Sclerotinia* sp.). (The damping-off of sour orange seedlings due to *Sclerotinia* sp.)

Fruits d'Outre Mer, 1953, 8: 118-19, illus.

Sour orange seedlings in nurseries at the IFAC central station at Foulaya in French Guinea suffered severely from a damping off in which the bark and phloem at the collar were completely destroyed. It was due to a *Sclerotinia*, probably *S. sclerotiorum*. The symptoms and the fungus are described. Low-lying situations and wet weather favour the fungus. When attacks occur unattacked plants should be transplanted into soil disinfected with 0.1% orthoxyquinoline solution. The disinfection of soil before sowing is suggested, either at a depth with 1% commercial formaldehyde or on the surface by spraying with 5-10% formaldehyde.

3455. CHOWDHURY, S.

Further observations on foam disease of citrus.

Sci. and Cult., 1953, 18: 434-5, bibl. 1.

In further studies on the nature of foam disease [see *H.A.*, 20: 1926] of Khasi mandarin orange (*Citrus reticulata*) the author failed to produce symptoms in healthy plants by the inoculation of fungus and nematode isolates from affected trees or to achieve control by the application of fungicides and insecticides. He concludes that foam disease is a physiological disorder probably caused by lack of balance in the sugar metabolism. Splitting of the bark, he suggests, occurs as a result of pressure exerted by excess water absorbed during the rains. The foam exuded is believed to be due to fermentation by *Saccharomyces* spp. always found in it. No benefit was derived from working Khasi on other citrus rootstocks. The investigation is to be continued.—Plant Pathological Lab., Jorhat, Assam.

3456. CHILDS, J. F. L.

An actinomycete associated with gummosis disease of grapefruit trees.

Phytopathology, 1953, 43: 101-3, bibl. 13, illus.

Masses of gall tissue with channels of liquid gum, the whole more or less deeply buried in the xylem, constitute the gum pockets that are a characteristic feature of grapefruit trees affected with gummosis. An actinomycete has been found regularly in the gum pockets. It has been inoculated into the trunks and branches of mature grapefruit trees and typical symptoms of gummosis have resulted. [From author's summary.]—Bureau of Plant Industry.

3457. CHILDS, J. F. L.

Concentric canker and wood rot of citrus associated with *Fomes applanatus* in Florida.

Phytopathology, 1953, 43: 99-100, bibl. 3, illus.

In Florida concentric canker is of rather frequent occurrence on old trees of grapefruit, sweet orange and Dancy tangerine. In the absence of visible signs of wood decay the concentric type of bark canker is often an indicator of infection. An illustrated description is given of the symptoms which are usually associated with sporophores of a fungus tentatively identified as *Fomes applanatus*. The disease is not a limiting factor to the industry but it is of considerable importance in the general deterioration of citrus orchards in Florida. Surgical treatment is suggested for early infections, followed by disinfection and coating of the wound with suitable dressings. The disease is prevented by good pruning practice.—Bureau of Plant Industry.

3458. TABOADA, V. L. E., AND DOMATO, J.

Comportamiento de los nuevos portainjertos citricos con relación a la gomosis. (The behaviour of the new citrus rootstocks in relation to gummosis.)

From abstr. in *Idia*, 1952, 5 (58): 21.

Studies on gummosis in citrus caused by *Phytophthora* spp. gave the following results. (1) No species tested was immune. (2) *P. parasitica* was the most pathogenic followed by *P. citrophthora* and then by *P. palmivora*. (3) The scion-stock combination most resistant to

P. parasitica was Valencia Late on rough lemon. Valencia Late on sour orange, Mediterranean Sweet on Cleopatra, and Hamlyn on Cleopatra also showed good resistance. (4) The combinations most resistant to *P. citrophthora* were Valencia Late on sour orange and rough lemon, followed by Mediterranean Sweet on Cleopatra, Hamlyn on Cleopatra, and Ruby Blood on sour orange. The Cleopatra rootstock figured in two combinations in which no attack was recorded despite the fact that the scions were very susceptible. Hamlyn on Rangpur was a very resistant combination. (5) The most inconsistent rootstock was sweet orange, which was very susceptible except in combination with Mediterranean Sweet.

3459. BITTERS, W. P., AND BATCHELOR, L. D.

Gummosis resistance of Troyer citrange.

Calif. Citrogr., 1953, 38: 192, 200, bibl. 1.

Observations and records are presented which confirm that the Troyer citrange is highly resistant to gummosis caused by *Phytophthora citrophthora*.

3460. SPERONI, H. A.

Nota sobre una "gomosis" en el portainjerto de lima o mandarino Rangpur y en algunas de sus combinaciones. (Notes on gummosis in Rangpur lime or mandarin rootstocks and some of their combinations.)

Idia, 1952, 5 (58): 25-6, illus.

A gummosis has been observed for some years in Rangpur lime seedling trees and in the following varieties on Rangpur lime: Valencia Late, Lue-Gim-Gong, Robertson Navel, Parson Brown, Azores, Mandarina Campeona and common orange. It is caused by *Phomopsis citri* and its main symptoms are severe breakdown of the bark (compared with the characteristic smoothness of the trunk in *Phytophthora* gummosis) of the stem and main roots and abundant secretion of gum. Infected trees have alternate phases of decline and recovery. Control can be obtained by scraping the diseased bark, wrapping in clean cloth, disinfection, and dressing with asphaltic paint. Wounds heal rapidly. The use of Rangpur lime as a stock is not recommended except for Ruby Blood and Pera late orange.

3461. WAGER, V. A.

Melanose, stem-end rot, and shell-bark of citrus.

Fmg S. Afr., 1953, 28: 28-30, 33, bibl. 1, illus.

The symptoms of these three diseases of citrus in South Africa, all caused by *Phomopsis citri*, are described with the aid of illustrations. It has been found that the three applications of bordeaux mixture at 2:1:80 applied at 6-week intervals to control black spot caused by *Phoma citricarpa* [see *H.A.*, 23: 1160] also give good control of the phomopsis diseases, the first application, made when the fruit is very young, being particularly important.

3462. BRUN, J.

Dégâts causés par *Oospora citri aurantii* (Ferr.) Sacc. sur les bergamotes. (Damage to bergamot oranges caused by *Oospora citri aurantii*.)

Fruits d'Outre Mer, 1953, 8: 120-1, bibl. 3, illus.

Abscission of immature bergamot oranges took place

in August, 1952, due to *Oospora citri aurantii*. The fallen oranges had roundish, brownish to bronze patches on the skin.—Stat. centr. Foulaya, Guinée.

3463. JENKINS, C. F. H.
Fuller's rose weevil (*Pantomorus godmani* Crotch).

J. Agric. W. Aust., 1952, 1 (n.s.): 813-17, bibl. 3, illus.

Notes are given on Fuller's rose weevil, *Pantomorus godmani*. This leaf-eating beetle was first recorded in Western Australia in 1948 and is still confined to a few areas. Damage has so far been chiefly limited to citrus. Recommended control measures are the keeping down of weed growth, spraying with 0.5% DDT or 1½ lb. cryolite to 40 gal. water, and dust barriers of 10% BHC or DDT round the bases of the trunks.

3464. ARGENTINA.
Centro nacional de investigaciones agropecuarias: Instituto de sanidad vegetal. Centro regional Pampeano de investigaciones agropecuarias: Laboratorio de fitopatología del Delta; Estación experimental nacional de Concordia. (National centre of agronomic research: Institute of plant health. Pampeano regional centre of agronomic research: Delta phytopathological laboratory; National experimental station of Concordia.)

Idem, 1952, 5 (59/60): 18-25, 48-50, 52-4.

Institute of plant health. The bud mite, *Aceria sheldoni*, which is new to Argentina, attacked lemon in particular and rendered up to 30-40% of the fruit on individual trees worthless; satisfactory control was obtained with emulsifiable oil, wettable sulphur, Ca polysulphide and 2,4-D derivatives. In experiments in the control of the bagworm, *Oiketicus kirbyi*, DDT was not efficacious and BHC was efficacious only for the first few days after hatching, but arsenical sprays and dusts at suitable concentrations gave good control. *Delta phytopathological laboratory*. *Ceratitis capitata* attacks apple in January-April and citrus in February-early May and ceases its activity when mean temperatures fall below 14° C.; where only one of these two crops is grown, attacks are few. In poison bait tests diastase malt gave the best results and 3.5% ammonium phosphate was unsatisfactory. *National experimental station of Concordia*. Trials showed that the lemon varieties Villafranca, Sicilia and Cereschio are to be recommended for their high summer yield and good quality.

3465. EUROPEAN PLANT PROTECTION ORGANIZATION.

Report of the Mediterranean Plant Protection Conference, Sicily, October 1952. Appendix I—Summary of discussion on *Ceratitis capitata* Wied. [English and French.]

[Publ.] *Eur. Plant Prot. Org.*, 1952, pp. 19-23.

The appendix contains notes on papers on *Ceratitis* read at the Conference. A summary of the important parts follows. *Italy*. Control on peach is obtained by spraying 5-6 times between mid-June and mid-August, either with 15-20% parathion at 0.1% concentration plus 5% sugar or with 30% DDT at 1% concentration.

Israel. The critical temperature for egg-laying is 16° C. In autumn infestation of citrus is severe but the larvae are killed by the gummy secretion of the wounded tissue and the fruit's natural oils. As the fruit ripens it becomes more susceptible to larvae and 5% of the fruit in which eggs are laid in December may become wormy. In spring the intensity of the infestation depends on climatic factors. Worminess does not occur on Jaffa oranges until the end of March but may occur earlier on grapefruit and Washington Navel. Fly-punctured fruit can safely be exported till early in March. Ethylene dibromide applied to crated Jaffa oranges under a tarpaulin at 20 g. per cu. m. for 2 hours at 83° F. destroyed 80% of the larvae in the fruit. *Tunisia*. Commercial BHC gives good results if applied to the ground under the trees at 2.5 g. per sq. m. 10 days before picking and again at picking. *Algeria*. DDT and dieldrin give more lasting protection than phosphoric ester, chlordane, chlorinated camphene and aldrin. Dieldrin, which is heat-resistant, should be used in summer and DDT at other seasons.

3466. FRÉZAL, P.

État actuel de la lutte contre la cératite (*Ceratitis capitata* Wied.). (Control of *Ceratitis capitata*; the present position.) *Congr. pomol. Fr.* 1952, being *Suppl. Pomol. franç.*, 1953, pp. 49-80, bibl. 98.

This review article discusses the present position with regard to control of *Ceratitis capitata* with special reference to Algerian citrus plantations. Methods currently employed are cultural, physical, mechanical, chemotropic, insecticidal and biological. Cultural methods include disruption of the annual cycle of generations by isolating citrus areas from other fruit-growing areas and separating early and midseason varieties from late varieties; collection and destruction of infested fruit; cleanliness in plantations, packing stations and stores. Physical methods include destruction of eggs and larvae in fruit by cold or heat treatment. In a chemotropic control test in Algeria in 1951 the 6 attractants tested in their order of merit were: bran water plus biammonium phosphate (6,040 captures), clenisel (4,393), fermented bran water (2,480), 3% biammonium phosphate (2,412), 3% ammonium sulphate (1,349) and vinegar (515); in a subsequent comparative test of 4% ammonium salts biammonium phosphate was again the best. In insecticidal control tests in Algeria with sprays of DDT, BHC, chlordane, SNP, Gamma BHC, aldrin and dieldrin against the adult, DDT at 0.2 or 0.25% gave the best results. Control of young adults emerging from pupation in the soil and of eggs and larvae on harvested fruit is also discussed. Small hopes of satisfactory biological control in the Mediterranean area are entertained, unless effective parasites can be introduced. The author concludes that control of the fruit fly has improved in recent years partly owing to synthetic insecticides and partly to ammonium attractants, but that no method yet gives entirely satisfactory results.

3467. LA FOLLETTE, J. R., LEWIS, H. C., AND RONEY, J. N.

Leafhoppers on citrus in Arizona. *Calif. Citogr.*, 1953, 38: 141-2, illus.

The leaf hopper *Empoasca fabae*, and possibly *E. solana* have done some damage in recent years in Arizona by

causing rind oil spotting, especially on navel oranges. Dust application of 50 lb. per acre of 5% or preferably 10% DDT have given control, but DDT should not be used when cottony cushion scale is present.

3468. FUKUDA, J.

Studies on the resistance of citrus varieties to the arrowhead scale, *Prontaspis yanonensis* Kuwana. I. On the resistance of Natsudaidai, *Citrus natsudaidai* Hayata and *Citrus junos*. [Japanese, with English summary 1 p.] *Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat.*, 1952, No. 1, pp. 128-41, bibl. 6.

The numbers of larvae hatching are about the same on (1) Satsuma orange and Natsudaidai, but the survival rate is much lower on the latter, and (2) on trifoliolate orange and Junos, but the survival rate on the latter is nil.

3469. GERHARDT, P. D., AND LINDGREN, D. L.

Dictyospermum scale in California.

J. econ. Ent., 1952, 45: 874-7, bibl. 16.

Of 49 scale samples sent to the California Citrus Experiment Station for routine determination from Ventura County in 1950, 9 were identified as *Chrysomphalus dictyospermi*. The scale, which can be found in some commercial plantings of avocado, is a potential pest of citrus in the state, especially in the coastal areas. Laboratory fumigation tests indicated that dictyospermum is non-resistant to HCN fumigation. [From authors' summary.]

3470. MANEFIELD, T.

White wax scale on citrus.

Qd agric. J., 1952, 75: 348-9.

White wax scale, *Ceroplastes destructor*, is now the major scale pest of citrus in southern Queensland coastal districts and has caused some concern in inland areas in wet years. Control is obtainable by spraying in early December with 20 lb. washing soda (or 7½ lb. soda ash) plus 1½ pints detergent (34-40% active ingredients) in 100 gal. water, but spraying is rarely necessary in inland areas where the summer high temperatures and low humidity effect a natural control.

3471. YUST, H. R.

Visible reactions of California red scale in relation to resistance to fumigation with HCN.

J. econ. Ent., 1952, 45: 985-7, bibl. 9.

The results of the experiments described did not indicate that the closure of the tracheae or other visible reactions could account for hydrocyanic acid resistance in strains of California red scale, *Aonidiella aurantii*.

3472. RIEHL, L. A., AND LADUE, J. P.

Evaluation of petroleum fractions against California red scale and citrus red mite.

Reprinted from *Advances Chem. Ser.* 7, 1952, pp. 25-36, bibl. 26, as *Pap. Calif. Citrus Exp. Stat.* 704.

The insecticidal efficacy under laboratory conditions of one naphthalenic and one paraffinic series of petroleum fractions was determined for adult female California red scale, *Aonidiella aurantii*, and eggs of the citrus red mite, *Paratetranychus citri*. Studies showed that (1) the conventional spray oils contain some hydro-

carbons of low insecticidal activity, and (2) the efficacy of oils may be considerably improved by proper selection of hydrocarbons.

3473. VERGANI, A. R.

Control de la cochinilla roja Australiana. (Control of citrus red scale.)

From abstr. in *Idia*, 1952, 5 (58): 20-1.

As a result of severe early fruit drop attributed to the use of oil emulsions in the control of red scale, experiments were made with different grades of oil. The least burning was caused by light (S.A.E. 50-60) and medium oils. It is recommended that emulsions of these should be applied when the fruit reaches 25-30 mm. diameter.

3474. JENKINS, C. F. H., AND SHEDLEY, D. G.

The citrus white fly (*Aleuroplatus citri* Tal.).

J. Agric. W. Aust., 1953, 2: 49-55, bibl. 2, illus.

This pest was first recorded in Western Australia in 1950 and has since been found widely distributed in several scattered localities. The chief host is lemon. The insect weakens the tree but the chief injury is the fouling of the fruit with sooty mould fungus for which the honey dew secreted by the insects is a good medium. Control can be achieved with a white oil-nicotine sulphate spray.

3475. METCALF, R. L., AND MARCH, R. B.

Behavior of octamethyl pyrophosphoramido in citrus plants.

J. econ. Ent., 1952, 45: 988-97, bibl. 10, illus.

³²P-tagged octamethyl pyrophosphoramido (OMPA) has been used at the California Citrus Experiment Station, Riverside, to study the behaviour of this systemic insecticide in lemon and orange plants, and its insecticidal action against citrus red mite *Paratetranychus citri* and greenhouse thrips, *Heliothrips haemorrhoidalis*. Concentrations of from 20 to 50 micrograms of OMPA per gram of leaf tissue were lethal to the female citrus red mite in 48 hrs, while a concentration of about 4,000 micrograms per gram leaf was required to kill the adult female greenhouse thrips. Radio-autographs were obtained of leaves showing the distribution of OMPA applied in water culture to bark and to leaf surfaces.

Citrus—harvesting, packing, storage and by-products.

(See also 3507p, t, 3657.)

3476. DESZYCK, E. J., REITZ, H. J., AND SITES, J. W.

Effect of copper and lead arsenate sprays on the total acid and maturity of Duncan grapefruit.

Proc. Fla St. hort. Soc. for 1952, pp. 38-42, bibl. 6, being *J. Ser. Fla agric. Exp. Stat.* 128.

On mature Duncan grapefruit trees copper sprays increased the total acid content of the juice and decreased the soluble solids/acid ratio, thus delaying the time of legal maturity attainment of the fruit. Lead arsenate sprays lowered the total acid content and increased the soluble solids/acid ratio, thus resulting in earlier maturity. The effectiveness of lead

arsenate in producing early maturity was somewhat decreased by copper sprays. The time of application of copper sprays had no effect on the total acid content or the ratio value. The time of application of lead arsenate sprays, however, did affect the ratio value, this being highest when the trees were sprayed at the post-blossom stage.

3477. SIDDAPPA, G. S.

Quality standards for South Indian citrus fruits.

Indian J. Hort., 1952, 9 (4): 7-24, bibl. 6.

Studies of the peel, rag, juice, Brix value, acidity and Brix-acid ratio were undertaken to enable the formulation of quality grading standards for the marketing of oranges and limes in Madras State.

3478. SMITH, R. J.

Use of precooler for oranges in half-box carton.

Calif. Citrogr., 1953, 38: 190, 204-6, bibl. 2.

The half-box carton, now the principal container for Californian lemons, has not yet been widely used for oranges. Lemons are stored and cooled before shipment, but oranges are commonly loaded at temperatures ranging from 70° to 100° F. The cartons, being unventilated, do not permit rapid cooling in refrigerated cars. Possible methods of overcoming this difficulty are discussed and a trial is described in which oranges were pre-cooled for 2 days, packed unwrapped in cartons in the cooling room, and then shipped to New York in iced cars. Estimated savings on carton shipment amounted to 55.7 cents per standard box made up of packing materials 8.5 c., packing labour 8.2 c., freight 15 c., icing 4 c., and unwrapping labour in the retail market 20 c.

3479. WINSTON, J. R., AND MECKSTROTH, G. A.

Control of orange decays by pyrrolidine alone and mixed with 2-aminopyridine.

Proc. Fla. St. hort. Soc. for 1952, pp. 78-83.

Pyrrolidine is an effective inhibitor of decay in Florida oranges. It is more effective than 2-aminopyridine against green mould rot but less effective against stem-end rot. A mixture of pyrrolidine and 2-aminopyridine is more effective against decay from all causes than is either applied separately. This combination gives promise of being more effective than the Dowicide A + hexamine mixture, particularly when the fruit is held for a long period. The addition of hexamine to pyrrolidine caused serious rind injury without effecting decay control. [Authors' summary.]—U.S.D.A., Orlando.

Dates.

3480. MUNIER, P.

Sur l'origine du palmier-dattier. (On the origin of the date palm.)

Fruits d'Outre Mer, 1953, 8: 47-52, bibl. 28.

The origin of the date palm is not known but its cultivation probably dates from the beginning of the first great civilizations in the region between Libya and south-west Persia. In this area the habitats of *Phoenix reclinata* and *P. sylvestris* coincide and *P.*

dactylifera may be a hybrid.—Stat. Palmier-dattier, Kankossa, Mauritanie.

3481. ANON.

Palmier-dattier. Irrigation. Physiologie. Techniques culturales. (The date palm. Irrigation. Physiology. Cultural technique.)

Rapp. Cons. Exp. Rech. agron. Algér.

1951/52, 1952, pp. 36-7, 148-51, 156-7.

Irrigation (pp. 36-7). In an experiment still in progress at Ain-ben-Noui with the variety Mech-Degla, heavy de-salting irrigation in winter (every 5 days in winter and every 10 days in summer) is being compared with heavy summer irrigation (every 5 days in summer and every 10 days in winter). In comparison with the control year 1949, yields in 1950 and 1951 respectively were 151% and 122% with heavy winter irrigation and 96% and 80% with heavy summer irrigation. *Physiology* (pp. 148-51). Preliminary conclusions from pollen studies begun in 1951 are that male inflorescences from the same tree do not all produce pollen with the same germinating power, pollen with a normal appearance does not always germinate, some pollens do not germinate at all while others have low viability, some pollens germinate slowly and others quickly, pollen stored by the traditional methods rapidly loses its viability. The period of receptivity of female flowers of the varieties Deglet-Nour, Mech-Degla and Ghars was studied in pollination tests. The rate of fertilization is very good up to 8 days from the opening of the spathe of the female inflorescence and remains good up to 12 days, provided there is no fall in temperature. *Cultural technique* (pp. 156-7). Bad weather interfered with an experiment on the effect of fruit thinning on Deglet-Nour. Thinning one-third of the centre of the inflorescence with and without shortening the inflorescence by one-third were compared with the untouched controls. Thinning plus shortening gave a distinctly greater average weight per date than the control, but the gross yield was 18% less.

3482. RYGG, G. L.

The effect of sulfur dust and exposure to high temperatures on the sulfur content and acidity of immature Deglet Noor dates.

Proc. Amer. Soc. hort. Sci., 1952, 60: 204-8, bibl. 4.

The "dry" grades of Deglet Noor date fruits have a higher sulphur content and a lower pH value than fruits in more desirable grades. The trials reported showed that sulphur contents and pH values were not consistently affected by sulphur dusts used to control mites. Before 1 September no relation was found between sulphur contents and pH values, but after that time there was a highly significant negative correlation. When bunches were cut at intervals throughout the growing season and held at temperatures of 40°, 45°, 50° and 55° F. it was found that the higher temperatures tended to lower pH values slightly early in the summer but raised them markedly between late July and the end of the growing season. High temperature injury decreased materially as the season advanced. It is concluded that neither dusting with sulphur nor high temperatures in late summer and autumn appear to be responsible for the high sulphur contents or the high acidity of "dry" grades of dates.

Litchis.

3483. OCHSE, J. J.

Observations on rooting of lychee cuttings.
Proc. Fla St. hort. Soc. for 1952, pp. 186-7,
 bibl. 12.

Tip cuttings of the Brewster litchi were taken each month from November, 1951, till May, 1952. The rooting media tested were Everglade muck, commercial granite hen grit, and watersoftener pearls. Fog propagators were used in a slat-covered greenhouse, a slat house, and in the open. Cuttings taken during the "dormant" period, from November to March, all formed profuse callus but no roots. Cuttings taken during the "flush" period, April and May, gave a high percentage of rooting in the muck medium in the greenhouse or in the pearl medium in the open. With normal careful handling the rooted cuttings could be potted up and established successfully.—University of Miami.

3484. SINGH, M. P.

Mineral composition of fruits of the litchi (*Litchi chinensis* Sonn.) and loquat (*Eriobotrya japonica* Lindl.).

Indian J. Hort., 1952, 9 (4): 53-8, bibl. 6.

The mineral composition of the different parts of the fruit of litchi and loquat are given. The data show that the chief mineral requirements of both plants are N, P and K, especially K.

Macadamia.

3485. FAHMY, I.

Grafting studies on macadamia and sapodilla in relation to carbohydrates, using pre-girdled scions.

Proc. Fla St. hort. Soc. for 1952, pp. 190-2,
 bibl. 5.

In an experiment conducted at the Sub-Tropical Experiment Station, Homestead, Florida, the effect was studied of pre-girdling the scions on the accumulation of carbohydrates and percentage take of grafts. With macadamia (*M. ternifolia*) there was a highly significant accumulation of starch and hydrolysable carbohydrates in girdled twigs compared with ungirdled ones, but there was no significant difference between the percentage take of the grafts. Early summer appeared to be the most suitable time for grafting, as a high percentage take was then obtained from both girdled and ungirdled scions. With sapodilla (*Achras zapota*) girdling of the twigs resulted in a highly significant increase in dry matter, total sugars, starch and hydrolysable carbohydrates. Very satisfactory results were obtained using either pre-girdled or ungirdled scions grafted in early spring. At other times of the year girdling was essential to success.

Naranjilla.

3486. LEDIN, R. B.

The naranjilla (*Solanum quitoense* Lam.).
Proc. Fla St. hort. Soc. for 1952, pp. 187-90,
 bibl. 12, illus., being *J. Ser. Fla agric. Exp. Stat.* 106.

Many attempts have been made to introduce the naranjilla into the United States, but without success.

Recent test plantings at the Sub-Tropical Experiment Station, Homestead, have shown that the plant is very susceptible to nematode infestation. In 1949, plants of naranjilla were grafted onto the root-knot resistant species *Solanum macranthum*, and were thus successfully brought to the fruiting stage. Since then *S. verbascifolium*, *S. hirsutissimum* and the tree tomato, *Cyphomandra betacea*, have been used successfully as rootstocks. Grafting can readily be accomplished by the cleft graft. The technique is described.

Olives.

(See also 3507c.)

3487. BENEDETTI, A.

Los viveros de olivos en Italia. (Olive nurseries in Italy.) [English summary 1 p.]
Bol. Oleic. int., 1953, 3: 13-22, illus.

The method of raising grafted olive plants in nurseries in Tuscany is described. Unsuitable conditions are low temperatures, long droughts or excessive humidity, heavy infertile soils, and exposure to north winds. Soils should be light enough to permit free root growth but cohesive enough to enable plants to be raised with a ball of earth round their roots for final planting out; the most suitable are alluvial soils with a neutral or slightly alkaline reaction. There are 3 distinct phases in the cultural cycle, those of the seedbed, the grafting bed and the transplanting bed. Sowing occurs up to the end of summer in the first year; the seedlings are transplanted in the spring to the grafting bed where they undergo grafting the following spring. In the third spring the grafted plants are transplanted and they are ready for final planting out in the field in spring-autumn two years later. Seeds of cultivated olives are used, since those of wild olives are susceptible to the cold and produce seedlings with short internodes inconvenient for grafting. Sowing occurs in cold frames in soil previously mixed with 2-3 times its volume of sand and copiously watered. 3-4 kg. of seed are sown per sq. m. of bed and this should give a final yield of 1,650 grafted plants suitable for planting out. Plants are sometimes bought by growers a year after grafting and planted in their own transplant beds whence they are planted out 2 years later; this practice is cheaper than buying older plants and allows the plants to become acclimatized.

3488. BALLOT-ELANT, —, AND OTHERS.

Note sur la multiplication de l'olivier par bouture ou par greffage. (Note on the propagation of olives by cuttings or by grafting.)

Terre maroc., 1953, 27: 14-16, bibl. 4.

Notes are given on some recent French and Italian papers and on some observations made in Morocco. There appears to be little to choose between cuttings and grafting as means of propagating olives.

3489. ANON.

Olivier [et figuier]. Multiplication. (Olive. Multiplication.)

Rapp. Cons. Exp. Rech. agron. Algér.
 1951/52, 1952, p. 155.

Multiplication by cuttings from small branches was tried at Sidi-Aïch with a view to hastening the propagation of recently introduced varieties. The percentage

success with 3 local varieties was: Chemlali 90, Limli 30, Sigoise 46. It is still considered preferable to multiply selected clones by grafting.

3490. MICHELI, A.

Esperienze e problemi dell'olivicoltura in Cirenaica. (Experiments and problems in olive growing in Cyrenaica.) [English summary 5 lines.]

Riv. Agric. subtrop., 1953, 47: 66-75.

These notes refer to the period before 1943. *Propagation and varieties.* It was found most satisfactory to use plants imported from Italy. The Apulian variety Coratina gave the highest yields while the Tuscan varieties, Frantoi, Corregiolo and Leccino also did well. Of African varieties Chemlali showed the least tendency to biennial bearing while the Tripolitanian Righiani also gave good yields. *Cultural technique.* The coastal areas and western Gebel are unsuitable for unirrigated olive growing. On the lower slopes of the Gebel pebbly or calcareous soils are better than red earths with a deep arable horizon. Notes are given on intercropping, spacing (12×12 to 14×14 m.), pruning (light), rate of growth, yield of fruit and of oil. *Irrigation.* Three irrigations per annum should suffice, the first just before flowering (irrigation during flowering interferes with fruit set), the second in June and the third in August. In early life the rate can be 1-1.5 cu.m. per tree per irrigation, but for trees over 10-12 years old it should be at least 3 cu. m.

3491. HARTMANN, H. T., AND HOFFMAN, R. M.

Olive fruiting behavior.

Calif. Agric., 1953, 7 (2): 9-10, illus.

In California flower differentiation in olives occurs in mid-March and full bloom about 8 weeks later in mid-May. A preliminary trial in 1951 with the variety Sevillano showed marked increases in fruit set and yield from a first irrigation on 1 or 14 April as compared with a first irrigation on 18 May. In 1952 trees of the variety Mission received 3 irrigation treatments to maintain: (1) ample soil moisture throughout the period of flower development, (2) soil moisture just above wilting percentage up to 20 March and thereafter ample moisture, and (3) soil moisture just above wilting percentage throughout the period of flower development. The results from treatments 2 and 3 were similar and no fruit set occurred. The supply of ample water from the time of induction onwards by comparison resulted in a marked increase in the total number of inflorescences at full bloom, a marked decrease in the percentage of inflorescences dropping before bloom, more flowers per inflorescence, a much higher proportion of perfect flowers and an ultimate set of 7.2 fruits per 100 inflorescences.

3492. D'ARMINI, M.

Forte infezione di rogna in due oliveti colpiti da grandine. (Serious outbreaks of olive knot disease in two olive groves damaged by hail.)

Ann. Fac. Agrar. Perugia, 1950, 7: 43-51, bibl. 1, illus. [received 1953].

Olive groves in neighbouring parts of Tuscany and Umbria suffered severely in an extremely heavy hail-storm in June, 1949. Deep wounds were inflicted and lengths of young branch were almost completely

stripped of bark; rapid and serious outbreaks of olive knot disease (*Pseudomonas savastanoi*) ensued. Some trees died and others were defoliated. The progress of the disease in 2 groves is described. The varieties Olivella and Raggia were more resistant than Borgione, Moraiolo, Corregiolo and Olivo Dolce, but varietal resistance became most evident after the age of 15 or 16 years. Two treatments with bordeaux mixture soon after the storm delayed the progress of the disease but did not cure it; such treatment is, however, advisable until the wounds have healed, and is also desirable for its indirect effects. Trees that had received treatment showed a better growth flush and a lower level of infection the next year.—Inst. Pat. veg. Univ. Perugia.

3493. CICCARONE, A.

Osservazioni sulla "gelatina" e su alcune gommosi del colletto e delle radici degli olivi. (Notes on the "jelly" disease of the olive, a gummosis of the collar and roots.) [English summary 11 lines.]

Boll. Staz. Pat. veg. Roma, 1951 (issued 1953), 9: 205-13, bibl. 13, illus.

The symptoms of the "jelly" disease of the olive tree, as observed in Latium, are necrosis and gummosis of the main roots and collar, the exudations being most abundant in the spring. Branches corresponding with the affected roots die back. The condition is common in cold clays, being due to the poverty of the soil and its excessive humidity in winter, and it opens the way to fungal attack. It can be cured by laying bare the affected parts and leaving them exposed to the sun throughout the summer, removing the dead bark, and painting with lime. It may be necessary to repeat the treatment some years later.

3494. SANTORO, R.

Ricerche con prodotti organico-sintetici in rapporto a *Dacus oleae*, a entomoparassiti ed insetti vari eseguite in Ascea (Salerno) nel 1951. (Studies of the effect of some synthetic organic insecticides on *Dacus oleae*, its parasites and other insects conducted at Ascea in 1951.) [English summary ½ p.]

Ann. Sper. agrar., 1953, 7: 31-62, bibl. 9.

Biological equilibrium of the insect fauna of the olive tree. Four trees were treated respectively with (1) 50% DDT applied 4 times between July and October inclusive, (2) 25% DDT plus 25% gamma BHC at 4% similarly applied, (3) 20% phosphoric ester at 5% 3 times in September-October, and (4) untreated control. The insects killed were counted. As in 1950 it was found that: the chlorinated compounds had a powerful contact insecticidal effect and a moderate residual effect revived by light rain; the phosphoric ester had a powerful contact insecticidal action and a residual effect which largely disappeared after 10-12 days; no conclusion could be drawn regarding the biological equilibrium after 2 years. *Effect of insecticidal treatment on fruit drop.* (1) Under treatment with chlorinated compounds insect attack was low and development and maturation of fruit were normal. (2) Under phosphoric ester treatment 70% of the attacked fruit suffered no damage as the larvae died on hatching, but the remainder of the attacked fruit failed to develop properly and fell early. *Effect of*

*phosphoric esters on pupae and larvae of *Dacus*.* Laboratory experiments showed that 5% and 6% concentrations of 20% phosphoric ester were effective, and that penetration of the active principle is directly proportional to the duration and area of contact.—Filippo Silvestri Lab. Ent. agrar. Portici.

3495. CARRANTE, V., STRUSI, A., AND DE DONNO, S. *Secondo contributo alle esperienze di oleificio. (A second note on olive oil extraction.)* *Ann. Sper. agrar.*, 1953, 7: 241-88, illus.

Notes are given on oil extraction tests with different olive varieties by machine (with and without grinding and pressing, centrifugal) and by solvent. [See also *H.A.*, 23: 1214.]

Passion fruit.

3496. MELVILLE, F. *The passion fruit. Its cultivation in Western Australia.* *J. Agric. W. Aust.*, 1952, 1 (n.s.): 737-47, illus.

Notes are given on passion fruit growing in Western Australia, where the fruit is in increasing demand for processing. The most commonly grown types are varieties of the purple-fruited *Passiflora edulis*; the best commercial variety is the medium-sized hard-shelled type. Information is given on propagation by seed, spacing, summer irrigation, the vertical and horizontal trellis systems, and control of brown spot disease. Yields of up to 4 tons of fruit (250 bushels) per acre are obtained under good conditions.

3497. DEKKER, P. *De peermeloen en passiflora. (The melon pear and passion fruit.)* *Cult. Hand.*, 1953, 19: 36-7, illus.

The author gives information obtained from C. M. v.d. Slikke who for some years has carried out trials on the cultivation of the melon pear (*Solanum muricatum*) and passion fruit (*Passiflora edulis*) under glass in Holland. The results suggest the possibility of their commercial cultivation under glass. The melon pear is propagated vegetatively and advice is given on raising material for cuttings. The "mother" plants should be grown at temperatures above 7° C. and cut back hard to induce the rapid production of new shoots. These should be cut off when 10 cm. long. The preparation of the cutting bed and the treatment of the cuttings are described. The young plants should be kept well aerated and the temperature should range from 15° C. to 22° C. With good treatment the flowers should set at the end of June, and the first ripe fruits be obtained at the end of August. Passion fruit can be raised from seed or from layers or cuttings. The seed should be sown in fine sand or leaf mould in a frame at a temperature of 21°-24° C.; germination takes about 4 weeks. The plants should be kept well pruned. Fruiting in the first year is not to be relied on. In the second year the first flowers appear in May, and the fruit ripens during July and August.

3498. MACPHERSON, N. *Banana passion fruit.* *N.Z. J. Agric.*, 1953, 86: 286-7.

Banana passion fruit grows well in mild subtropical

climates. The fruit is long and oval and when ripe is golden yellow. Two main varieties are the red-flowered *Passiflora van volxemii* which begins to ripen in late February or early March, and the pink-flowered *P. mollissima* which begins to ripen in late March or early April. The vines continue to bear until September-October. Recipes are given.

3499. MARICONI, F. A. M.

*O percevejo do maracujá, *Diactor bilineatus* (Fabr., 1803). (The passion fruit bug, *Diactor bilineatus*.)* *Biológico*, 1952, 18: 116-20, illus.

The granadilla (*Passiflora quadrangularis*) and other *Passiflora* species are becoming rarer in São Paulo, Brazil, partly owing to the attacks of *Diactor bilineatus*. Notes are given on its geographical distribution, the damage caused (the leaves, flower buds and young fruits are attacked by the nymphs and the stem, flower buds and fruit by the adults), and the morphology and biology of the pest. Control is obtainable by spraying with 5% Rhodiatox at the rate of 20 g. per 10 l. water when the flower buds appear and subsequently every 15-20 days.

Persimmon.

3500. RAO, U. N., AND OTHERS.

*Vegetative propagation trials with the persimmon (*Diospyros kaki* Linn.).* *Indian J. Hort.*, 1952, 9 (4): 1-6, bibl. 15.

Notes are given on recent experiments at Coonoor Pomological Station on the vegetative propagation of persimmon. Propagation by ground layering, marcottage and cuttings was unsuccessful. Approach grafting on *D. lotus* stocks and on persimmon root-suckers in January-March succeeded.

3501. IWAGAKI, H.

Studies on the pleiomery and oligomery in kaki fruits with special reference to the number of ovarian cavities. [Japanese.] *J. hort. Ass. Japan*, 1951, 20: 1-10, bibl. 33, illus.

Observations based on 12 examinations of fruits of 5 varieties of Japanese persimmon (*Diospyros kaki*) showed that some fruits have more than the normal 8 cells in the ovary, whereas those having less than 8 are rare. In some varieties irregular fruit form resulted from abnormally high or low numbers of cells in the ovary. In a previous report it had been suggested that increases in the number of ovary cells, which occurred more often in the "on" than in the "off" year, depended on nutrition.

Y.A.

Tung.

(See also 3657, 3681.)

3502. CARBANO DE KRETSCHMER, E.

El tung y su comercialización. (Tung and the tung trade.) [English summary 1½ pp.] *Publ. Esc. Agron. B. Aires* 1, 1952, pp. 99, bibl. 44, map.

The purpose of this paper is to survey the development of the tung trade in Argentina and to estimate its economic position and prospects. Information is given on the tung trade throughout the world, the require-

ments of the tree, methods and areas of cultivation in Argentina, and properties and uses of the oil.

3503. POTTER, G. F., AND CRANE, H. L.

Tung production.

Fmrs' Bull. U.S. Dep. Agric. 2031, 1951, pp. 41, illus. [received 1953].

In the U.S.A. tung [*Aleurites fordii*] is grown successfully in a narrow belt in the south, mostly along the Gulf of Mexico. The requirements of the crop as well as methods of training and cultivation generally are discussed. Figures of yields, costs and returns are also presented.

3504. ANON.

Tung.

A.R. Nyasaland Dep. Agric. 1951, 1953, pp. 22-32.

Budding versus seedlings. An experiment started in 1940 has confirmed the superiority of budded tung trees. Trees from buds of selected mother trees on *montana* rootstocks gave a greater yield ($P = .01$) than the same clones on *fordii*, than seedlings from the same mothers, and than unselected seedlings. **Clone trials.** Seedling trees on estates have shown a distinct biennial bearing tendency during the last 6-8 years; experience shows that lack of N manuring and cultivation are not causes (as had been thought). The highest yielding among clones planted in 1940-41 were again the B-types 10 and 14, and the A-types M8 and M13. The promising dwarf clones 9 and N4 were planted in December, 1945, at 3 spacings: for 1949-50-51 clone 9 (2,924 lb. air dry seed per acre) gave a significantly ($P = .01$) higher yield than N4 (2,697); it also significantly ($P = .01$) outyielded N4 at all spacings, giving 4,589 lb. at $7\frac{1}{2} \times 7\frac{1}{2}$ ft., 2,779 at 10×10 ft., and 1,403 lb. at 15×15 ft., compared with 4,259, 2,610 and 1,223. **Intercropping and cover crops.** In 1945 a comparison of 4 soil management systems was laid down; in 1951 the mean yields were (1) grass and weed cover slashed twice yearly and mulched round the trees, with 1 lb. sulphate of ammonia each time—6.57 lb. air-dry seed per tree; (2) soya annually—5.91; (3) maize/legume alternately—5.84; and (4) *Glycine javanica*—2.50. **Oil yield.** The oil content of dry seed of 5 of the main commercial *montana* clones was: ZM13, 43.0%; 10, 44.3%; 14, 41.5%; ZM8, 41.9%; N24, 40.3% compared with 46.1% for *fordii*.

3505. WIEHE, P. O.

The spread of *Armillaria mellea* (Fr.) Quel. in tung orchards.

E. Afr. agric. J., 1952, 18: 67-72, bibl. 5.

At the Tung Experimental Station, Cholo, Nyasaland, the incidence of *Armillaria* was recorded in fields with the following histories: (1) woodland trees ring-barked 2 years before planting tung, (2) woodland trees not ring-barked, stumps from previous fellings scattered throughout the area, (3) tung established on treeless fields which had been under annual crops for 20 years. After 8 years the infection rate was 1.6% in the ring-barked area compared with 19.4% in the non-ring-barked area, the number of infection foci were 5 and 29 respectively, and the calculated amount of oil lost in the latter area was ten times greater. Ring-barking does not entirely check infection, as there are other primary sources, viz. the roots of small woody plants impossible to ring-bark for practical reasons, infected nursery

stock, contaminated tools, and spores. Evidence of infection sources other than woody roots is provided by the contraction of infection by some trees on the treeless, long-cultivated land. The critical infection period for tung is between its 6th and 8th years and thereafter there is a marked reduction in infection.

3506. U.S. DEPARTMENT OF AGRICULTURE PRODUCTION AND MARKETING ADMINISTRATION, FATS AND OILS BRANCH.

Tung processing and marketing practices and costs.

Market. Res. Rep. U.S. Dep. Agric. 10, 1952, pp. 33, bibl. 13.

An analysis is made of the methods, practices and economic efficiency of the processing mills through which the U.S. domestic tung crop passes.

Noted.

3507.

a CAMERON, J. W., AND SOOST, R. K.

Size, yield, and fruit characters of orchard trees of citrus propagated from young nucellar-seedling lines and parental old lines. *Proc. Amer. Soc. hort. Sci.*, 1952, 60: 255-64, bibl. 6, being *Pap. Calif. Citrus Exp. Stat.* 740.

For another account see *H.A.*, 23: 1105.

b CAMERON, J. W., AND SOOST, R. K.

Nucellar lines of citrus.

Calif. Agric., 1953, 7 (1): 8, 15-16.

For another account see *H.A.*, 23: 1105.

c DE CAPITE, L.

Le principali varietà di olivo e la loro distribuzione geografica nella Catalogna. (The principal varieties of olive and their geographical distribution in Catalonia.)

Ann. Fac. Agrar. Perugia, 1950, 7: 210-23,

bibl. 7, illus. [received 1953].

Notes on 19 varieties.

d CHILDS, J. F. L.

Pruning citrus in relation to disease control. *Proc. Fla St. hort. Soc.* for 1952, pp. 83-8, bibl. 9, illus.

e DEAN, H. A.

Spider mites of citrus and Texas citrus mite control in the Lower Rio Grande Valley of Texas.

J. econ. Ent., 1952, 45: 1051-6, bibl. 5.

f DEBACH, P., AND ERICKSON, L.

Rooted lemon fruits for citrus pest studies.

J. econ. Ent., 1952, 45: 1097-8, bibl. 7, illus. See also abstract 3418.

g DEBACH, P.

Purple scale parasites in southern California. *Calif. Citrogr.*, 1953, 38: 219-22.

Possible biological control of *Lepidosaphes beckii*, notably by the introduced wasp *Aphytis "X"*.

h DUDNIK, A. N.

Pot cultivation of lemons. [Russian.] *Priroda*, 1953, 42 (3): 119.

A note on indoor lemon cultivation.

i FAZLULLAH KHAN, K., AND MUTHUSWAMI, S. *Promising varieties of avocado (Persea gratissima Mill.) for South India.* *Indian Fmg.*, 1953, 2 (11): 20-1.

Fuerte, Peradeniya purple hybrid and Pollock.

j FLESCHNER, C. A., AND ARAKAWA, K. Y. *The mite Tydeus californicus on citrus and avocado leaves.* *J. econ. Ent.*, 1952, 45: 1092, bibl. 1, illus. See also *H.A.*, 23: 2138.

k FRÉZAL, P. *Principales maladies virusiformes des agrumes. (The principal virus diseases of citrus.)* *Congr. pomol. Fr.* 1952, being *Suppl. Pomol. franç.*, 1953, pp. 81-118, bibl. 150, illus. A review.

l KESTERSON, J. W., AND HENDRICKSON, R. *The glucosides of citrus.* *Proc. Fla St. hort. Soc.* for 1952, pp. 223-6, bibl. 7, being *J. Ser. Fla agric. Exp. Stat.* 94. In grapefruit and orange fruits.

m MARTIN, J. P., BAINES, R. C., AND FOOTE, F. *Fumigating soil for citrus replants.* *Calif. Citrogr.*, 1953, 38: 216-18. Recommendations on procedure for using D-D.

n PRATT, R. M. *Seasonal and geographical distribution of some citrus insects and mites in Florida.* *Proc. Fla St. hort. Soc.* for 1952, pp. 50-5, bibl. 2, being *J. Ser. Fla agric. Exp. Stat.* 129. Purple and Florida red scales, purple and rust mites.

o PUSSARD, R. *À propos de la présence en France de *Dialeurodes citri* Ril. et How. (Hém. Aleyrodidae). (The occurrence of *Dialeurodes citri* in France.)* *C.R. Acad. Agric. Fr.*, 1953, 39: 199-201. First reported 1945; notes on control.

p SALE, J. W., AND OTHERS. *Analysis of lemon oils.* *J. Ass. off. agric. Chem., Wash.*, 1953, 36: 112-19, bibl. 8.

q SCHROEDER, C. A. *The carob in California.* *Fruit Var. hort. Dig.*, 1952, 7: 24-8, illus. Includes a list of seedling selections.

r STEARNS, C. R., JR., AND OTHERS. *Method of applying insecticides with different spray machines.* *Proc. Fla St. hort. Soc.* for 1952, pp. 42-6, bibl. 3, being *J. Ser. Fla agric. Exp. Stat.* 111. Dilute and concentrate sprays for citrus.

s TANAKA, S., AND YAMADA, S. *Studies on a greasy spot (black melanose) of citrus. I. Confirmation of the causal fungus and its taxonomic study.* [Japanese, with English summary 1 p.] *Bull. hort. Div. Tōkai-Kinki agric. Exp. Stat.*, 1952, No. 1, pp. 1-15, bibl. 23, illus. *Mycosphaerella horii*.

t WINKLER, W. O. *Methods for the examination of lemon oil.* *J. Ass. off. agric. Chem. Wash.*, 1953, 36: 119-23, bibl. 4.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(See also 2509, 2518, 3395, 3485, 3627s, u-x, 3635, 3639, 3644, 3661, 3668, 3672, 3673, 3675.)

3508. WEBSTER, C. C.

The organization of agricultural research in an African colony. *Emp. Cott. Grs' Rev.*, 1952, 29: 157-66, bibl. 2.

The author discusses the difficulties that have in the past impeded the progress of agricultural research in African colonies. Some improvement may be expected from the establishment of regional research organizations, such as E.A.A.F.R.O., which will in future be responsible for hitherto neglected basic research, and from reorganization within certain Agricultural Departments such as that in Kenya with which the author is associated. Both regional organizations and the Departments will be interested in the second or technological stage of research, and the Departments will remain wholly responsible for the third stage, the introduction into practice. Despite these improvements much more needs to be done if the urgent and vital need for research into the problems of African agriculture is to be adequately met. Various steps necessary to achieve this are indicated.

PLANTATION CROPS.

3509. FARNWORTH, C. H.

The agriculture of Uruguay.

Foreign Agric. Bull. U.S. Dep. Agric. 3, 1952, pp. 133, bibl. 35, maps, 35 cents.

A survey is given of geographical features, agricultural industries, trade and agricultural policy. Half the bulletin is devoted to tables of statistics. Horticulture is of minor importance in Uruguay, fresh fruits and vegetables being produced entirely for domestic consumption with the exception of small quantities of citrus. Grapes, the most important fruit crop, are used almost entirely for domestic wine production. Tobacco is a minor crop.

3510. DE FINA, A. L., AND GARBOSKY, A. J.

Difusión geográfica de frutales en el Chaco Argentino. (Geographical distribution of fruit trees in the Argentine Chaco.) *Cien. y Invest.*, 1952, 8: 449-53.

Cacao, pineapple, banana, lemon, date, olive, fig, vine, walnut, peach, pear and apple were tried in 42 places in the Argentine Chaco which comprises the National Territory of Formosa, President Peron Province (formerly the National Territory of Chaco) and the extreme north-east of the Province of Santiago del Estero. Only three did well, the banana in the extreme

north-east of Formosa, the lemon in Formosa and President Peron Province near the Paraguay river, and the fig in the corner of President Peron Province adjacent to Santiago del Estero and Santa Fe.

3511. CHATTERJEE, D., AND RANDHAWA, G. S. Standardised names of cultivated plants in India—I. Fruits. II. Cereals, pulses, vegetables and spices. *Indian J. Hort.*, 1952, 9 (2): 24-36; 9 (4): 64-84.

Common, botanical and vernacular names are given, together with brief remarks on origin, areas of cultivation and other points of interest.

3512. OCHSE, J. J. A note on a new quick method of propagation by cuttings. *World Crops*, 1953, 5: 208, illus.

A method of propagating cuttings of tropical trees in a constant spray of water is described. The cuttings are planted with their leaves on in full light in bins of coarse sand or other open, well-aerated planting media. Best results are obtained at the beginning of the growing season and rooting is ordinarily complete in 3-6 weeks. After rooting, the plants are transplanted into pots and if possible should remain for a few days under the spray to harden off before coming into normal conditions. [See also *H.A.*, 23: 1092.]

3513. IDNANI, M. A., AND CHIBBER, R. K. Utilization of wild legumes for green manuring. *Sci. and Cult.*, 1953, 18: 362-4, bibl. 5.

The N, P, K and Ca contents of the leaves of 38 leguminous plants and trees [some well known as cover crops or shade trees] are tabulated. Only in one case was the leaf N below 2% and in 3 cases it exceeded 5%. Leaves can be sun-dried without loss of manurial value and their use as N fertilizers is advocated.

3514. RINGOET, A. Recherches sur la transpiration et le bilan d'eau de quelques plantes tropicales. (Palme à huile, caféier, cacaoyer, etc.) (Research on the transpiration and water economy of some tropical plants. (Oil palm, coffee, cacao, etc.)) *Publ. Sér. sci. I.N.E.A.C.* 56, 1952, pp. 139, bibl. 42, illus.

This memoir records research conducted by the Physiology Division of I.N.E.A.C. at Yangambi in 1946-49. After a critical review of the methods of measuring transpiration, details are given of an ecological study of transpiration in which its diurnal progress and seasonal variation and the effects upon it of shade and soil moisture were investigated. *Elaeis guineensis*, robusta coffee and cacao were among the plants studied. The role and importance of water in the plant are then discussed under the following headings: action of the stomata, direct use of atmospheric moisture by the aerial parts, moisture content of tissues and its diurnal variation, and growth in relation to soil humidity. Finally a study of the water economy of the oil palm is described.

3515. GONZÁLEZ MENDOZA, R. Contribución al estudio de las moscas Anastrephas en Colombia. (A contribution to the study of *Anastrepha* fruit flies in Colombia.) [English abstract 1/2 p.] *Rev. Fac. nac. Agron. Colombia*, 1952, 12: 423-550, bibl. 38, illus.

This thesis contains a review of the literature and a report of the author's own observations and investigations on *Anastrepha* spp. in Colombia, where these flies are considered the most important pests of fruit. Information is given on nomenclature, biology, areas of occurrence, host plants and damage, and control. A very wide range of plants is attacked, including cherimoya, guava, papaw, coffee, mango, citrus, pineapple, banana, vine, apple and passion fruit. For satisfactory control a combination of chemical, cultural and biological measures is necessary. The following materials, used either as foliage sprays or applied to the soil at the time of pupation, proved highly toxic to the pest: chlordane at 0.5%, DDT at 0.5%, methoxychlor at 0.01%, toxaphene at 0.5%, aldrin at 0.0002%, dieldrin at 0.0003% and pyrenone at 0.25%. Refrigeration and sterilization of fruits are important quarantine measures. There are several parasites of potential economic importance.—Medellín nat. School Agric., and Chinchiná nat. Res. Centre for Coffee.

3516. STEINER, L. F. Fruit fly control in Hawaii with poison-bait sprays containing protein hydrolysates. *J. econ. Ent.*, 1952, 45: 838-43, bibl. 2.

Enzymatic protein hydrolysates of soy or yeast greatly increased the attractiveness of bait sprays containing sugar and parathion or metacide to the oriental fruit fly, *Dacus dorsalis*, and the Mediterranean fruit fly, *Ceratitis capitata*. Wettable powder formulations of EPN and lindane and an emulsifiable formulation of compound 22008 (3 methyl-1 phenyl-5 pyrazolyl dimethylcarbamate) were also very effective as bait sprays when supplemented with sugar and protein hydrolysate, but DDT, dieldrin, aldrin, chlordane and nicotine bentonite were too slow-acting for this purpose. Replicated tests in which small areas of guava foliage were treated indicated that the sprays are most effective while drying. Since these bait sprays attracted flies for distances of at least 50 ft., less thorough coverage was required than when conventional residual-type sprays were used. The bait sprays were also less harmful to parasites. In small-plot tests bait sprays containing protein hydrolysate, sugar and parathion gave excellent oriental fruit fly control on bananas and good control on mangoes and guavas. [From author's summary.]

Bananas.

(See also 3266, 3516, 3627t.)

3517. WARDLAW, C. W.

The banana.

New Biol., 1951, No. 11, pp. 66-87, illus.

This general article deals with some aspects of the history, botany, cultivation, diseases, breeding and storage of the banana, with particular reference to Gros Michel.

3518. JAMAICA DEPARTMENT OF AGRICULTURE.

Investigations 1950-51. Cultivated trees, shrubs and vines: Banana.
Bull. Dep. Agric. Jamaica 49, [1953?], pp. 91-110.

New varietal trials. 16 new banana varieties were on trial at Caenwood. Three of the most promising (1877, 4577 and 6204) are to undergo final shipping trials. Use of small suckers as planting material. There appeared to be no difference in yield between tall swords (over 2 ft. 6 in.) and short swords (2 ft.-2 ft. 3 in.) and no advantage in cutting off the cabbage or planting in a leaning position. Effect on Lacatan fruiting of removal of suckers. Removal of suckers at the peeper stage throughout the life of the parent plant or up to the stage of "bullying", i.e. when the inflorescence ascends the pseudostem, prolonged the pre-cropping period, reduced the size of the fruit and weakened the plants. Limiting removal until after harvest was inferior to control (standard pruning) only in the weight of hands yielded. Performance of different types of Lacatan suckers. There was little difference between the heights at maturity and the yields of maiden suckers, half-heads, quarter-heads and peepers, but peepers were the slowest to mature. Blinding of buds on suckers and fruit production. There is a possibility that blinding increased the number of hands, but it did not appear to affect the period of growth. Lacatan spacing trials. The spacings were 11×11 , $9\frac{1}{2} \times 9\frac{1}{2}$, $8\frac{1}{2} \times 8\frac{1}{2}$, $7\frac{1}{2} \times 7\frac{1}{2}$ and $6\frac{1}{2} \times 6\frac{1}{2}$ ft. It appears very unlikely that spacings under 8×8 ft. would give good results over a period of years. Lacatan fertilizer experiments plant crop 1945-50. N increased yield by 10-20% at 3 stations and shortened maturing time by 1-2 $\frac{1}{2}$ months at 2 of these. K at 2 levels appeared to increase yields and reduce maturing time at one station but at the higher level appeared to depress yield at 2 stations. P gave no positive response at any station but the higher level appeared to depress yields at one station. Farmyard manure in one annual application gave slight yield increases at 2 stations. Studies on Panama disease on Gros Michel. Plantations where Gros Michel has been grown continuously for over 20 years and which show little or no Panama disease always had at least 1 ft. of well-drained, well-aerated top soil, alkaline in reaction, of medium to heavy texture, and with moderate to high available K. Sites where Panama disease is severe usually have either depleted top soil, a neutral or acid reaction, light texture, low fertility or poor drainage, or combinations of these properties.

3519. SIMMONDS, N. W.

The development of the banana fruit.

J. exp. Bot., 1953, 4: 87-105, bibl. 21, illus.

The banana fruit is either seeded or vegetatively parthenocarpic; the latter may or may not be seed fertile, depending on a complex of cytogenetical factors. Edible pulp (a starchy parenchyma), which fills the fruit in parthenocarpic types and surrounds the seeds in seeded bananas, mostly originates from the outer lining of the loculus (the innermost layer of the pericarp). The graphs of growth in volume of seeded banana fruits are sigmoid in shape. Those of parthenocarpic fruits are variable but are not sigmoid and the shapes are related to specific origins. Growth rates are related

to certain ovule behaviours, to seed content of the fruit, and to ploidy. α -Naphthylacetic acid induces parthenocarpy in seeded bananas and stimulates it in weakly parthenocarpic types. By contrast, coumarin, a hormone inhibitor, inhibits it in strongly parthenocarpic forms. Physiological and genetical implications of the results are discussed. Fruit development is thought to be under hormone control and two phases of development of the parthenocarpic fruit can be distinguished. The desirability of distinguishing between the terms "seedless" and "parthenocarpic" is pointed out. [Author's summary.]—Imp. Coll. trop. Agric., Trinidad.

3520. COOIL, B. J., AND SHOJI, K.

Studies reduce banana chlorosis.

Hawaii Fm Sci., 1953, 1 (5): 1, 8, illus.

Severe chlorosis was observed on a plantation of Cavendish bananas growing in 6-18 in. of slightly alkaline (pH 7.49-8.39) surface soil over almost pure beach sand. The more chlorotic and stunted plants were found in the shallowest soil. Acidification of the soil had no effect, but Fe foliage sprays produced an immediate, if temporary, response. The highest increase in chlorophyll content and the most permanent cure, however, was achieved, contrary to expectation, by slow-acting soil applications of Ferro-Grene (5.59% iron content). Investigations continue.

3521. ROMBOUTS, J. E.

The micro-organisms in the rhizosphere of banana plants in relation to susceptibility or resistance to Panama disease.

Plant and Soil, 1953, 4: 276-88, bibl. 5.

The rhizosphere microflora of the very susceptible Gros Michel and the resistant Congo variety was studied with a view to determining its influence on susceptibility to Panama disease. Micro-organisms capable of producing antibiotics inhibiting the growth of *Fusarium oxysporum-cubense* were occasionally found but there was no difference in their distribution in the 2 varieties. No specific influence of soil types could be observed. It was impossible to detect any specific influence of roots of the 2 banana varieties on the survival time of the pathogen in soil samples.

3522. GANE, R., AND OTHERS.

The refrigerated gas-storage of Gros Michel bananas.

Food Invest. tech. Pap. D.S.I.R. Lond. 3, 1953, pp. 46, bibl. 26, illus., 2s.

The 24 pilot plant experiments described in this report were carried out over 2 years at Kingston, Jamaica. The fruit used was of the maturity grades generally shipped to Great Britain ("full") and to North America ("high $\frac{3}{4}$ full"). It was stored at 53° C. for a "voyage period" (12-18 days) in a rapidly circulated atmosphere, carbon dioxide and oxygen being controlled by restricted ventilation. In the first series of trials development of ethylene caused CO₂ production to rise and ripening to begin. Gas storage retarded ripening, but the fruit did not ripen satisfactorily when removed from storage. In a second series of experiments it was shown that by introducing low concentrations of ozone the storage atmosphere could be kept sufficiently free from ethylene to prevent the initiation of ripening. "Full $\frac{3}{4}$ " fruit stored under these conditions was held for 20 days without any initiation of ripening

and was subsequently ripened satisfactorily at 68° F. Further experimental work on a pilot plant scale is, however, required before the use of ozone in refrigerated gas or air storage can be seriously considered. The apparatus and techniques used are described.

3523. ANON.

Banana stumps found suitable paper base.

Foreign Comm. Wkly., Wash., 1952, 48 (19):

15, from abstr. in *Trop. Abstr.*, 1953, 8: 31.

The Handmade Paper Research Centre in Poona has developed a method of preparing high-grade kraft paper from banana stump fibres and jute in a ratio of 60% to 40%. The annual production of kraft paper in Bombay State, with 40,000 acres of bananas, has been estimated at 11,500 tons. In view of the difficulty of transporting the banana stumps, the establishment of a processing plant for every 4 acres of bananas has been suggested.

Cacao.

(See also 3627a.)

3524. BARTOLOME, R.

Cacao.

Philipp. J. Agric., 1951 (issued Nov. 1952), 16: 1-50, bibl. 149, illus.

This general paper discusses the history and geographical distribution of cacao cultivation, the species and varieties of *Theobroma*, the morphology of the plant, cultural methods and processing.

3525. PARHAM, B. E. V.

Cacao in Fiji—review and prospects.

Agric. J. Dep. Agric. Fiji, 1952, 23 (2): 14-24, bibl. 15, illus.

Several attempts to develop cacao growing in Fiji from 1880 onwards failed through lack of interest by planters. These earlier attempts are reviewed and information is given on local sources of plant material and on recent introductions. Suggestions are made for a practical research and field programme for the immediate future.

3526. ALVIM, P. DE T.

Algunos estudios fitofisiológicos del Centro Interamericano del Cacao. (Some physiological studies at the Interamerican Cacao Centre.)

Rev. Consor. Centr. agric. Manabí, 1952, 12 (72): 5-12, bibl. 10.

A preliminary account is given of 3 aspects of the work being done on cacao physiology at Turrialba. (1) *The effect of water deficiency on stomatal movement.* The stomata on a cacao leaf close more quickly during wilting than those of any other species tested. The fact that only a slight water deficit is sufficient to cause stomatal closure indicates that cacao is not suited to districts subject to prolonged droughts. Where there is sufficient soil moisture the stomata do not close during the day even when exposed to strong sunlight. The infiltration method of determining stomatal closure could be used to determine irrigation requirements. (2) *Resistance of the leaves to desiccation.* Experiments have shown that half of the total area of a cacao leaf is killed when it loses 25.08% of its water content. Coffee leaves are not damaged to the same extent until they have lost 41.82% of their water content, and other

plants tested have an even higher resistance. This low resistance to desiccation, together with the rapid closure of stomata as a result of water deficiency, explains why cacao cuttings must be rooted in an atmosphere of very high humidity. (3) *The causes of physiological cherelle wilt.* When the trunk of a cacao tree was ringed, the fruits below the ring developed cherelle wilt but those above the ring did not. When a chupon of less than 2 in. in diameter was ringed, however, the reverse was true. It is concluded that cherelle wilt is due to an insufficient supply of organic substances, probably sugars, produced by the leaves, and that young chupons draw on the mother plant for their supply of these substances. On chupons of more than 4 in. in diameter fruits above the ring did not wilt, showing that these were independent of the mother plant for organic nutrition. A preliminary experiment showed that 6-10 leaves were necessary for the normal development of each fruit. Hormone sprays have been used with success to control cherelle wilt, probably because they increase the translocation of carbohydrates to the fruit.

3527. POLANIA TRUJILLO, H.

Germinación del polen de cacao, crecimiento del tubo polínico y cuajamiento. Sus relaciones con el sombrío, el pH del estigma, estados del árbol y períodos estacionales. (Pollen germination, pollen tube growth and fertilization in cacao in relation to shade, the pH of the stigma, the vegetative condition of the tree and the season.)

Acta Agron. Palmira, 1953, 3: 9-39, bibl. 27, illus.

In experiments with six- to seven-year-old grafted trees of Palmira clones 5 and 6 (Angoleta subtype), season, shade, the pH of the stigma at the moment of fertilization, and the vegetative condition of the tree all had considerable influence upon fertilization. Percentage fertilization by artificial pollination showed a maximum (32.65) in June-August and 2 minima (20.30 and nil.40) in April-May and September-October. 25% to 50% was the optimum shade; at nil, 25, 50, and 75% shade the numbers of beans per pod were 22.8, 27.5, 33.5 and 22.3 respectively. A pH value of 4.5 for the stigma at pollination was the optimum; the number of beans per pod with pH values of 4.0, 4.5 and 5.0 were 25.8, 32.6 and 35.4 respectively. Trees which were growing actively at fertilization yielded 29.5 beans per pod compared with 25.7 for trees in a dormant condition.—Estación Experimental Agrícola, Palmira.

3528. SANCLEMENTE PINEDA, M.

Problemas de incompatibilidad en el cacao. (Problems of incompatibility in cacao.)

Acta Agron. Palmira, 1953, 3: 65-88, bibl. 18, illus.

Experiments with self-sterile trees led to the following conclusions: (1) incompatibility is generally due to an inhibitory substance which delays development of the pollen tube; (2) the application of hydrogen peroxide or K permanganate to the pistil in some cases destroys this substance and permits normal development of the pollen tube; (3) vitamin B₁ deficiency is sometimes a cause of inadequate fertilization in self-sterile flowers

and this can be overcome experimentally by the application of hormone plus vitamin B₁.

3529. KUPPERS, J. R.

Some biometric observations on cacao fruit.

Science, 1953, 117: 354-5, bibl. 2.

In an attempt to determine a better basis for the selection of improved types of Forastero \times Criollo cacao in Panama, 70 samples averaging 10 fruits were measured as regards average weight of individual fruits, average weight of individual dry seeds, average number of seeds per fruit and average weight of dry cocoa per fruit. The least variable factor was the average number of seeds per fruit and the mean and median values coincided in this case. With the other attributes the coefficient of variation ranged from 22% to 28%, and the means were higher than the medians, indicating that trees bearing unusually heavy fruit, seed or yield of dry cocoa per fruit had been selected more frequently than trees with unusually low values for these attributes. The average weight of dry cocoa per fruit was significantly correlated with the remaining 3 attributes, of which the most dependable was the average weight of individual dry seeds.—United Fruit Co., La Lima, Honduras.

3530. SÁNCHEZ POTES, A.

La antracnosis foliar del cacao. (Leaf anthracnose of cacao.)

Acta Agron. Palmira, 1953, 3: 41-64, bibl. 16, illus.

Young plants of Palmira clones 1, 2, 5 and 6 (all of the purple varieties of the Angloleta subtype and the Forastero type) were employed in a study of leaf anthracnose (*Colletotrichum theobromicolum*). Mature and fairly mature (pale to dark green) leaves are less susceptible than young and fairly young (red to pale pink) leaves. Clones 5 and 6 are susceptible, 1 is much less so and 2 is resistant.

3531. THAYSEN, A. C., AND FORSYTH, W. G. C.

The fermentation of the cocoa bean.

J. agric. Soc. Trin. Tob., 1952, 52: 403-7.

Notes are given on 3 years' research work on cocoa bean fermentation at the Colonial Microbiological Research Institute, Trinidad.

3532. AMMANN, W.

New bases for the appraisal of raw beans.

Int. Choc. Rev., 1952, 7: 4-6, from abstr. in Abstr. curr. sci. tech. Lit., 1952, 5, No. 623.

A system of penalty points is drawn up for appraising beans. Penalties are given for the percentage of beans showing deterioration due to moths, moulds, fermentation and slatiness. Thickness, weight, length, and number sprouted are not considered important characteristics. Instructions are included for the number of bags and beans to be sampled from different size lots.

Cinchona.

3533. EBES, K.

The effect of spacing and thinning on the yield of *Cinchona ledgeriana*.

Neth. J. agric. Sci., 1953, 1: 44-53, bibl. 1.

The layout of an experiment started in Indonesia in 1933 to determine the effect of spacing and thinning on

yield of *Cinchona ledgeriana* is described. The experiment was planned to last 25 years but was interrupted in 1942 by the Japanese occupation. Data recorded during these first 9 years are tabulated and the results summarized as follows. The production of clone Tjib. 5 was about 20% higher than that of Tjin. 1. Planting of 7,200 and 8,600 trees per ha. produced less than the widest spaced plantings of 5,000 per ha. and the closest spaced plantings of 12,600 per ha. The difference in yield between plots of very different spacings was relatively small, but the plots with the densest stand gave the greatest average production of quinine sulphate. The economics of dense planting are discussed. Height of tree was found to be practically independent of spacing, in contrast to girth which was a function of it. Close spacing produced slender trees with thin bark, but expressed as a percentage of the radius such bark was not relatively thinner than that of widely spaced trees. The ring content of quinine (pure quinine in dry bark from samples cut 1 m. above the ground) showed a slight tendency to decrease with age, after reaching a maximum in the sixth year. The preliminary conclusion is reached that, with regular thinning and fertilization, close spacing of cinchona is technically desirable and gives the highest yield.

3534. EBES, K.

The thickness of bark and bark per dm.² of cinchona.

Neth. J. agric. Sci., 1953, 1: 54-8, bibl. 1.

With a view to measuring sample plots of cinchona for the construction of yield tables, it was found that measurement of the amount of dry bark per dm.² was more accurate than measurement of the thickness of bark. The low correlation found between thickness of bark and yield of dry bark per tree is attributed to (1) faults in measuring bark thickness, and (2) variability of the bark per dm.²/bark thickness.

3535. LOVE, H. T., COWGILL, W. H., AND HOPP, H.

Test of a proposed method of sampling cinchona bark for fluorometric analysis for quinine.

Proc. Amer. Soc. hort. Sci., 1952, 60: 279-82, bibl. 3.

Samples consisting of a single disc of bark taken from the trunk of each tree at a height of 3 ft. were compared, in plantations 3 to 8 years old, with samples taken by the standard method which consists of 12 discs taken at a height of 1 to 3 ft. The proposed new method met statistical tests for mean difference, variability, curvilinearity, slope of the regression line, and origin of the regression line. It can, therefore, be used interchangeably with the standard method when large numbers of trees are to be sampled.

Coconuts.

(See also 3627b, g, i.)

3536. JOHN, C. M.

Coconut cultivation.

Indian Central Coconut Committee, Ernakulam, 2nd edition, 1952, 9 $\frac{1}{2}$ \times 6 in., pp. 42, illus., Rs. 0-10-0.

This booklet is designed to assist the Indian grower and is popularly written. It contains sections on coconut culture and on diseases and pests and their control.

3537. JAMAICA DEPARTMENT OF AGRICULTURE.
Investigations 1950-51. Cultivated trees, shrubs and vines: Coconut.
Bull. Dep. Agric. Jamaica 49, [1953?], pp. 114-16.

Correction of debility of standing coconut palms (p. 115). This replicated experiment was laid down in 1947 in a 10- to 12-year-old coconut plantation that had not yet come into bearing with the object of determining the effect of different cultural and fertilizer treatments on yield. There were 3 cultural treatments: forking, Napier grass cover, and natural cover; and 10 manurial treatments: 2 farmyard manure, and an 8-plot NPK test. *Cultural results:* The average number of nuts per tree (10 months' period) was 25.98 under forking, 16.73 under natural cover, and 11.68 under Napier grass. *Fertilizer results:* The best yields were with NP (24.04 nuts per tree), NPK (23.25) and 10 cwt. farm-yard manure (22.63). Yield was 11.04 with control; with other combinations it varied from N (19.38) to P (9.58). In terms of individual nutrients the effect of N was clearly significant. K increased yield in grass cover plots but not in forked or natural cover plots.

3538. SALGADO, M. L. M.
Carence potassique du cocotier. Diagnostic par le fruit. (*Potassium deficiency in the coconut. Diagnosis from the fruit.*)
Oléagineux, 1953, 8: 297-8, bibl. 14.

Potassium tends to become concentrated in the endocarp and milk of the fruit. K determination can be done directly on samples of milk by the cobaltinitrite-gravimetric method without prior elimination of sugars. In an experiment previously described [H.A., 18: 1433] the correlation between K content in the milk and K fertilizer level was close.

3539. LILY, V. G., AND OTHERS.
Observations on the inhibitory activity of a species of bacterium on some fungi parasitic on the coconut palm.
Indian Coconut J., 1952, 5: 162-70, bibl. 23, illus.

In recent studies at the Central Coconut Research Station, Kayangulam, on fungi associated with coconut leaf and root diseases, a species of bacterium was obtained which gave the plant tissue a measure of protection against some of the fungi isolated from diseased coconuts, namely *Helminthosporium halodes*, *Botryodiplodia theobromae*, *Rhizoctonia bataticola*, *R. solani*, *Gliocladium roseum* and *Fusarium* sp. The bacterium appeared to belong to the *Bacillus anthracis* group.

3540. LEVER, R. J. A. W.
Notes on outbreaks, the parasites and habits of the coconut moth *Artona catoxantha* Hamps.
Malay. agric. J., 1953, 36: 20-7, bibl. 15, illus.

The coconut moth, *Artona catoxantha*, is characterized by its sudden outbreaks at varying intervals and its sudden disappearance after reduction by parasites or wet weather. Notes are given on outbreaks in relation to weather, insect and fungal parasites, host plants and feeding habits, and non-biological control methods. It is generally better to let parasites and wet weather

control the moth than to use insecticides. The control exercised by the latter is apt to be offset by their destruction of the parasites.

3541. DHARMARAJU, E.
The biological control of the black headed caterpillar of coconut (*Nephantis serinopa* M.) in the East Godavari district of Madras State.

Indian Coconut J., 1952, 5: 171-6, illus.

The Razole Parasite Breeding Station is one of two engaged in the biological control of *Nephantis serinopa* in the East Godavari district. It rears and releases in coconut plantations the parasites *Perisierola nephantidis*, *Microbracon brevicornis*, *Elasmus nephantidis*, *Trichospilus pupivora* and *Trichogramma minutum*. The larvae of the first and second attack full-grown *Nephantis* caterpillars, the larvae of the third attack the pupae, the fourth is also a pupal parasite and the fifth attacks the eggs. Large numbers of parasites have been released in the last 5 years and as a result *Nephantis* has been largely kept in check. The biological and chemical control of *Natada nararia*, *Parasa lepida*, and psychid bag-worm caterpillars is also being studied.

3542. ANON.
Le séchage du coprah. Fours et séchoirs. (*Copra drying. Kilns and driers.*)

Agron. trop., 1953, 8: 73-81, bibl. 5, illus.

The chief types of copra-drying installation employed in French overseas territories are described. These range from simple ovens using the gases of combustion for drying the copra to the French-designed "Comessa" forced-draught kiln (illustrated) which has a 10 metric h.p. steam engine, a capacity of 16 wagon-loads, and a yield of 2 tons a day or 50 tons a month.

3543. MENSIER, P. H.
L'extraction de l'huile des amandes de coco fraîches. (*The extraction of coconut oil from fresh kernels.*)

Oléagineux, 1953, 8: 75-8, 131-4.

Four patented processes for extracting oil from fresh coconut kernels are described and discussed. These are Alexander's U.S. patents of 1921, Beckman's British patent of 1928, Lava's U.S. patent of 1937, and the Robledano-Luzuriaga Philippines patent.

3544. PILLAY, K. S., AND WARRIER, N. S.
Coconut pith as an insulating material.

Indian Coconut J., 1952, 5: 159-61, bibl. 1.

Tests showed that coconut pith (the refuse obtained during separation of coir from husks) has a thermal conductivity equivalent to granulated cork and that, bound into blocks with rubber latex, it is a suitable insulating material for fish boxes.

Coffee.

(See also 3627c, k.)

3545. TANGANYIKA (SANDERS, F. R.).

Advance 18th Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi, 1951, 1953, pp. 6 (mimeographed).

Improvement of planting material. Comparison of the yields of the clonal and seedling progeny of selections was continued. Conflicting results have been obtained

and since there is no difference in liquorizing quality it may be concluded that in view of the cost of producing clones it is economically sound to plant seedlings. *Improvement of growing conditions.* Ten years' comparison of the effects of elephant grass mulch, compost and ammonium sulphate shows that only compost has caused a significant increase in yield over the whole period; both mulch and ammonium sulphate applied alone might be effective, but ammonium sulphate applied with either mulch or compost has depressed the yield. In another experiment, in which banana trash mulch and irrigation each at 4 levels have been applied for 10 years, each treatment singly and in all combinations, has given greater yields than the nil treatment; the overall effects of mulch and of irrigation singly were significant and combined they gave a significant increase over mulch alone; the optimum combination appears to be 40 lb. mulch per tree and the lowest irrigation treatment (rainfall made up to 2 in. per month). In a pruning experiment normal multiple stem trees have yielded 32% more over a 14-year period than single stem trees, a mean increase of 2.87 cwt. per acre per annum. In an experiment begun in 1948 on 12-year-old coffee to assess the effect of time of pruning on the yield of shaded single-stem trees treatments consist of pruning from 1 to 6 months after harvesting; each delay of one month has resulted in a reduction of crop; the difference between the plot pruned immediately after harvesting and those pruned 5 months later is 47%, or 4.84 cwt. per acre per annum. *Liquorizing.* In tests of material from the clonal/seedling yield trial the most promising clones (all Bourbon) are N.39, I.60, N.30, N.5, N.218 and N.76; the most promising seedlings among Bourbon are N.39, L.1, N.197, N.182, N.81 and among Kent F.502 and H.61. In an age/liquorizing capacity experiment no significant differences attributable to age have occurred over a period of 3 years. There have been no differences in quality between single stem and multiple stem trees but Bourbon has tended to surpass Kent. Over 4 consecutive years mulch, irrigation and fertilizer treatments have had no apparent effect on quality. *Vegetative propagation.* Improved technique over the last 4 years has increased the percentage of cuttings striking within 6 months of being set from 36 to 85 and reduced deaths after rooting from 16% to 5%.

3546. SUNDARAM, S.

Factors favouring rooting of coffee sucker cuttings.

Indian Coffee, 1953, 17: 31-41, bibl. 8.

In investigations undertaken in 1951 and 1952 the experimental material, taken from four-noded suckers from 30-year-old trees, consisted of single-noded cuttings 3-4 in. long with the node at their upper end, and the lower end cut obliquely; the 2 leaves were cut back to half their length and the axillary shoots were removed. Cuttings from the first to the fourth node from the apex were treated separately. In the first experiment simple growth-promoting substances were used, such as carbohydrates, ammonium nitrate, ammonium phosphate, K permanganate, and 1% cow's urine extract (prolonged dip); and in the second, synthetic hormones such as α -naphthaleneacetic acid, β -indolylacetic acid, β -indolylbutyric acid, 2,4-dichlorophenoxyacetic acid, and also 4% cow's urine extract

(quick dip). In both experiments the bases of the cuttings were dipped for periods of 12, 24 and 48 hrs (the last being soon abandoned as it caused high mortality). The best results were given by treatment with a mixture of 0.2% ammonium nitrate and 3.0% dextrose for 12 hrs, followed by a further 12-hr dip in β -indolylacetic acid at 100 mg. per l. of water. Response of the more woody fourth internodes was comparatively less than that of the younger internodes. The satisfactory results with the combination of auxin, carbohydrate and nitrate suggested that the limited success obtained in the earlier experiments was due to deficiency of one or more of these substances.

3547. POUZA BICUDO, L.

O plantio do cafeiro em S. Paulo. (Coffee planting in São Paulo.)

Bol. Super. Serv. Café, S. Paulo, 1952, 27: 998-1013, illus.

A method of planting coffee in "hedge" rows is described and its advantages are discussed in detail. The method is especially recommended for use on old coffee soils where wide spacing is not economical. Furrows 30 cm. deep are taken out along the contour 3.2 m. apart. Coffee plants are set in these furrows 80 cm. apart, individually and not in groups of 3 or 4 as is the traditional practice. The space between the rows is cover cropped. This system requires very little labour for planting, facilitates mechanization and consequently lower costs of production, and helps to prevent erosion, while the rows themselves create efficient windbreaks.

3548. SUÁREZ DE CASTRO, F.

Distribución de las raíces del *Coffea arabica* L. en un suelo franco-limoso.

(The distribution of the roots of *Coffea arabica* in a clayey loam.) [English summary p.1]

Bol. téc. Fed. nac. Cafet. Colombia, 1953, 1 (12): 1-28, bibl. 13, illus.

A study of the distribution of arabica roots in a clayey-loam soil was undertaken in 1949-50. The trees were about 20 years old and averaged 163-171 cm. in height and 7.5-9.3 cm. in basal diameter. They were growing at 3 x 3 m. under the shade of *Inga* and *Cassia* and had not received any fertilizer. The methods employed are described. It was found that (1) in the soil in question coffee roots, both absorbent and anchoring, were very superficial (48% in the top 4 in.); (2) root systems were much better developed on deep than on shallow clay-loams; (3) the concentration of the roots diminished progressively from the trunk outwards; under the edge of the crown it was 45% less than the average; (4) no characteristic pattern related to root development was observable; (5) the weight of absorbent roots and the total weight of roots varied somewhat from tree to tree, but the percentage distribution between the different horizons was very similar for all the trees. The implications of these results is discussed.

3549. MACHADO S., A.

Notas técnicas. 1. Diario de nutrición del cafeto. 2. Renovación de cafetos viejos.

(Technical notes. 1. Analysis of coffee nutrition. 2. The rehabilitation of old coffee plantations.)

Bol. Inf. Colombia, 1953, 4 (37): 23-5 and 25-8.

These 2 experiments are complementary to one another and are being conducted in the same plantation.

1. Tables show (i) the variation of K, Ca, Mg and N in the different parts of young coffee trees in relation to increase in length of the main stem as measured fortnightly during the growing season; and (ii) the variation in the K_2O/N and the Ca plus Mg/K ratios in the different parts during the processes of flower and fruit development. The data are discussed; among other points they suggest K deficiency [see also *H.A.*, 22: 4354].

2. One of the problems the second experiment seeks to solve is whether similar soils under similar climates have lost their fertility as a result of prolonged coffee cultivation. A table gives the first 2 yields of young arabica and bourbon crops supplied with nil fertilizer, with bone meal, and with bone meal plus 48% K sulphate. Both varieties gave significantly higher yields with K than with the other 2 treatments. Bourbon with nil fertilizer gave yields equal to or greater than arabica with fertilizer.

Comparing the data of the 2 experiments the most interesting point is the correlation between the 3 following variables: (i) diminution of extension growth of the main stem without fertilizers; (ii) the low concentrations of some nutrients, especially K in the trees; and (iii) a marked increase in yield when the bone meal plots received K in addition.

3550. JAMAICA DEPARTMENT OF AGRICULTURE. Investigations 1950-51. Cultivated trees, shrubs and vines: Coffee. *Bull. Dep. Agric. Jamaica* 49, [1953?], pp. 117-18.

Mulching and fertilizer trial. Data for the second year's crop (1950) showed that Guinea grass mulch (2.94 tons cherry per acre) and Napier grass mulch (2.68) yielded 54% and 40% respectively more than the control (1.91) while bush mulch (2.04) had no significant effect. There was no evidence of any increase in yield due to working in the mulch or applying a NPK fertilizer.

3551. ANON. Brazilië: de bevloeiing der koffituiinen. (Brazil: irrigation of coffee gardens.) *Lat. Amer.*, 1953, 7 (2): 26, from abstr. in *Trop. Abstr.*, 1953, 8: 178.

Experiments carried out by the Ribeirão Preto Research Station have shown that coffee yields can be greatly increased by irrigation. The average yields from 1944 to 1951 for irrigated and non-irrigated plantations were in the proportion of 41 to 19. Notes are given on the cultivation of coffee in Brazil and the prevailing climatic conditions. [See also next abstract.]

3552. TEIXEIRA, E. F. Primeiros resultados da irrigação dos cafêzais de São Paulo. (Preliminary results of coffee irrigation in São Paulo.) *Estado de S. Paulo*, 6 August 1952, reprinted in *Bol. Super. Serv. Café, S. Paulo*, 1952, 27: 1038-40.

Results of experiments carried out at the Ribeirão Preto Experimental Station have shown that irrigation during the dry months of May-September can increase coffee yields by 119%, increase the amount of cured

coffee obtained per given weight of cherry by 17%, and advance maturity by about 1 month. The results of irrigation, however, can be very variable, and the dangers of irrigating young coffee and of not paying sufficient attention to soil structure are stressed.

3553. CASTAÑO, J. J.

Una afección nueva en *Coffea liberica*. (A new disease of *Coffea liberica*.)

Agric. trop. Bogotá, 1953, 9 (1): 29-31, bibl. 2, illus.

Two trees of *Coffea liberica* growing at the National Centre for Coffee Investigations, Caldas, Colombia, showed symptoms of a disease that had not been reported previously in Colombia. The trees suffered total defoliation and dark, irregular patches appeared at the nodes spreading along the stems and petioles. Investigations showed that the disease was caused by a species of *Phomopsis*.

3554. CASTAÑO, J. J.

Algunas observaciones sobre la "llaga negra" radicular del cafeto. (Observations on black root rot of coffee.)

Agric. trop. Bogotá, 1953, 9 (2): 41-7, bibl. 7, illus., and *Bol. inf. Colombia*, 1953, 4 (38): 30-4, bibl. 7, illus.

A review of the literature shows that the causal agent of black root rot of coffee is still uncertain. Observations made at the National Centre for Coffee Investigations, Caldas, Colombia, showed that trees were most likely to become infected when planted on freshly cleared forest soil that contained many decomposing roots and stumps and was rich in organic matter. This supports the theory that the causal organism is originally saprophytic. Young trees 1-5 years old are most liable to infection. Another predisposing factor was found to be a hollow round the tree caused by the sinking of the soil in the planting hole. Trees showing early symptoms of infection were restored to health by carefully exposing the roots and rubbing them with flowers of sulphur. The soil that had been removed was dusted with sulphur and some fresh soil containing wood ashes and lime was added to restore the pH.

3555. JONES, P. A.

Pectic enzymes in fermentation of coffee.

Mon. Bull. Coffee Bd Kenya, 1953, 18: 325-6, bibl. 3.

American experiments showed that pectic enzymes reduce fermentation time and thereby the possibility of coffee becoming discoloured or tainted; the optimum dose was 25-thousandths of 1% of the weight of the pulped beans (=25 units). A series of experiments was undertaken at the Kenya Coffee Research Station in 1952 to study the action of pectic enzymes and their effect on bulk coffee fermented in tanks. The tests covered a range of conditions with doses ranging from 15 to 80 units. The results were: (1) *Fermentation time*. All doses reduced the time to some extent but even the heaviest failed to clean the beans in the time deemed desirable for practical reasons, namely 12 hours; (2) *Effects of temperature*. Ambivalent temperatures did not appear to be too low for the proper functioning of the process. Small samples treated with 200-1,000 units at 70° F. became clean in 3-6 hours but the quality was inferior to that of the comparable undosed coffees; (3)

Effects on quality. Coffees fermented normally were consistently superior to enzyme-fermented coffees. Greater doses of enzyme tended to lower quality more than smaller doses. On the basis of one season's investigation pectic enzymes appear to be of little value in improving the processing and quality of Kenya coffee.

3556. HANSEN, R. E.

Chemical coffee curing.

Foreign Agric., 1953, 16: 155-6, illus.

In El Salvador increasing use is being made of a simple caustic soda process [not described here] to remove the pulp from coffee beans. Whereas fermentation usually takes 20-36 hrs the caustic soda process removes the pectic-gel coating in less than 1 hr, and thus avoids losses in green-coffee weights. The chemically cured coffee should have fuller flavour and aroma and show less variation in quality. There is also a possibility that the chemically digested pectin might be removed as a by-product.

Mangoes.

(See also 3516.)

3557. SINGH, L. B.

Vegetative propagation of mango (*Mangifera indica* L.) by air-layering (gootee). *Science*, 1953, 117: 158-9, bibl. 4.

Vigorous 2-year-old shoots, 1.5 cm. in diameter, of 30-year-old trees of the varieties Samarbhisti Alibag and Gopalbhog were marcotted by cutting 1-in. rings, scraping the exposed wood to remove cambium cells, treating the upper cut surfaces with 0.25%, 0.5% or 1.0% α -NAA or β -IAA in paste, covering with wet sphagnum moss, and wrapping in hessian. Rooted plants were removed and potted in 45-60 days. The best results—30-35% success—were obtained with 1.0% NAA.—Fruit Res. Stat., Saharanpur, U.P.

3558. MALLIK, P. C., AND DE, B. N.

Manures and manuring of the mango and the economics of mango culture.

Indian J. agric. Sci., 1952, 22: 151-66, bibl. 7.

Annual bearing in the mango is possible when the mature terminal buds do not all flower in one season and when some remain dormant and flower in the next. Cultural practices to induce this are desirable. To study the effect of fertilizers an 8-plot NPK test on the variety Langra was begun at the Fruit Research Station, Sabour, in 1940. The findings confirmed those of previous pot experiments [see *H.A.*, 20: 1085]. N controls the uptake of other elements and determines growth, its effect being greatest in combination with P and K. P and K singly or in combination have little effect. The proportions of NPK required by an adult mango annually are 1.1: 0.27: 1.0, the amount of N being 1.67 lb. Flowering and fruiting were in direct proportion to growth. Some pilot experiments were also carried out to determine the best organic and inorganic manures and the best time for their application. From these it was concluded that the annual dose should be divided into two, one containing ammonium sulphate and half the K being applied in June, and the other consisting of farmyard manure, P and the rest of the K in October. In "on" years the ammonium

sulphate dose should be doubled to force July-August shoots which mature and flower during the succeeding "off" year. [See also *H.A.*, 22: 1001.]

3559. KULKARNY, H. L., AND PATEL, R. C.

Blister leaf-galls of mango and their control. *Curr. Sci.*, 1953, 22: 48.

The life history was studied of the cecidomyiid fly *Allasomyia tenuispatha*, and of black cynopid wasps, both of which produce galls on mango leaves. BHC preparations applied to the new growth afforded protection to young shoots.—Inst. of Agriculture, Anand.

3560. SINGH, K. K., AND MATHUR, P. B.

Ripening of mangoes at controlled temperatures.

Bull. centr. Food tech. Res. Inst. Mysore, 1952, 2 (1): 14-16, bibl. 9.

Mangoes of the varieties Badami (Alphonso) and Totapuri (Bangalore) were ripened for up to 14 days at 67°-70° F. and at room temperatures of 75°-80° F. The presence or absence of wood wool packing did not affect ripening. Storage at the lower temperature range resulted in much reduced wastage, better colour development, increased % total soluble solids, and increased retention of acids and of ascorbic acid. At both temperature ranges ascorbic acid increased during storage in Badami and decreased in Totapuri.

Oil palms.

(See also 3650.)

3561. VANDERWEYEN, R.

Le croisement "dura \times pisifera" et ses premiers resultats. (Dura \times pisifera crossing and its first results.)

Bull. Inf. I.N.E.A.C., 1953, 2: 123-36, illus.

From the first, oil palm (*Elaeis guineensis*) breeding at Yangambi has been based on the thin-shelled tenera type. In 1939 the hypothesis—since proven—was first put forward that all dura crossed with all pisifera give 100% tenera and since 1948 all dura \times pisifera seed issued by the Station has received the same guarantee as tenera. I.N.E.A.C.'s present aim is to issue nothing but dura \times pisifera seed. Notes are given on the method of obtaining this. Analyses of the first yields from dura \times pisifera plants 5 and 6 years after planting out show 79% pulp per fruit, 7% kernel per fruit, 14% shell per fruit, 66% fruit per bunch, 52% pulp per bunch, 49% oil per pulp, 25% oil per bunch, and 4.6% kernel per bunch.

3562. FRASELLE, J. V.

Inspection phytosanitaire de quelques palmeraies du Mayumbe. (Phytosanitary inspection of some palm plantations in Mayumbe district.)

Bull. agric. Congo belge, 1953, 44: 75-90.

An inspection of the oil palm plantations of Mayumbe district showed that most are suffering from physiological troubles due to unfavourable ecological conditions and bad cultural practices. Common symptoms are "plant failure", dwarfing, deformation, chlorosis and necrosis of the leaves, stem and heart rot, stipe abnormalities, and underdeveloped and diseased root systems.

3563. VANDERWEYEN, R.

Comment déterminer la richesse en huile des fruits ou des régimes d'une palmeraie?
(Determination of the oil content of oil palm nuts or bunches.)

Bull. Inf. I.N.E.A.C., 1953, 2: 31-50, illus.

Sampling methods and analytical techniques are described for a young plantation about to come into production, an adult plantation due for replanting, and for the operation of buying station samples.

Papaws.

(See also 3627q.)

3564. HOFMEYR, J. D. J.

Sex reversal as a means of solving breeding problems of *Carica papaya* L.

S. Afr. J. Sci., 1953, 49: 228-32, bibl. 5.

By using sex reversal, which occurs in the flowers of both ♂ and ♀ plants due to recessive modifying genes, to permit self-pollination the period of inbreeding needed to produce superior 100% ♀ progeny may be reduced to 12 years compared with 36 years for brother and sister matings. It will then be necessary to plant only one seedling per hill instead of four, except in the few hills needed to provide 5% ♂ trees as pollinators.

3565. DE MENEZES, O. B.

Do sexo e sua "reversão" em *Carica papaya*.
(Sex reversal in *Carica papaya*.) [English summary 1 p.]

Rev. Agric. Piracicaba, 1953, 28: 1-12, bibl. 17, illus.

In order to investigate the suggestion that male papaw trees will produce female flowers in response to wounding, the terminal buds, leaves and young stems were removed from ♂ trees after flowering. This operation was carried out 3 times. The flowers produced after mutilation were somewhat bigger than those produced before. Some resembled ♀ flowers and others ♂ flowers in appearance but all were functionally ♂, i.e. had 10 stamens arranged in 2 series and a rudimentary pistil. In some cases the pistil was larger than normal and in a few cases small fruits were produced without seeds and with poor flavour. It is thought that these were produced as a result of a stimulation of the ovaries by growth substances produced in response to the wounding. There was no evidence of true sex reversal.

3566. SINGH, R. N.

Prospects of papaya (*Carica papaya* L.) breeding in India.

Indian J. Hort., 1953, 10 (1): 32-6, bibl. 11.

Selection and line-breeding, crossing and polyploidy are included in the papaw breeding programme at the Fruit Research Station, Saharanpur, U.P. For selection and line breeding, types which may give rise to promising varieties under local conditions are Washington Golden Yellow, Puerto Rico 48485, 47248 and 47175, Honeydew Ceylon, Madame Russel, Haiti, Improved Peterson, Sheffield UK, Kota round, Rhodesia and a number of local selections.

3567. CHARAVANAPAVAN, C.

The tapping of papaya for papain.

Trop. Agriculturist, 1952, 108: 189-90.

In a tapping experiment lasting 8 weeks bi-weekly

tapping of full-grown green fruits gave significantly higher papain yields than weekly tapping and 8 lancings per fruit than 3 lancings. Considering the time and labour involved, however, bi-weekly tappings with 3 lancings would be the most economical procedure.

Pineapples.

(See also 3393.)

3568. MENDIOLA, N. B., CAPINPIN, J. M., AND MERCADO, T. M.

Pineapple breeding in the Philippines, 1922-41.

Philipp. J. Agric., 1951 (issued Nov. 1952), 16: 51-84, bibl. 35.

Pineapple breeding in the Philippines from 1922 to 1941 is reviewed and the results discussed. The methods and materials employed were based on: (1) seedling varieties from seeds produced in the open from Red Spanish; (2) seedling varieties from seeds produced by artificial self-pollination involving Smooth Cayenne and two Red Spanish \times Smooth Cayenne hybrids, No. 15 and No. 491; (3) artificial hybrids of Red Spanish \times Smooth Cayenne and the reciprocal cross, Buitenzorg (Queen group) \times No. 28 (a Red Spanish \times Smooth Cayenne hybrid), and Smooth Cayenne \times Variegata (Spanish group) and the reciprocal cross; (4) production of artificial variations for selection by intergeneric crossing using hybrid No. 14 and *Cryptanthus zonatus*; and (5) colchicine treatment using a seedling of No. 14. New varieties produced are described. Treatment with a 0.05% solution of colchicine induced marked morphological changes in vegetative characters.

3569. LINFORD, M. B.

Pineapple diseases and pests in Mexico.

F.A.O. Plant Prot. Bull., 1952, 1: 21-5, bibl. 1.

Some differences are noted between climatic conditions in Loma Bonita, Oaxaca, Mexico, and Hawaii and in the appearance of the Smooth Cayenne pineapple grown in the two countries. In Mexico the most serious disease is marbled fruit (=fruitlet black or brown rot or bacterial fruitlet rot), a disease or group of similar diseases caused by bacteria. The trouble only develops during ripening, notably during the hot months of May and June when fruit acidity is relatively low. It is suggested that means be sought for reducing the proportion of the crop maturing in May and June, and that experiments be made with closer spacing to reduce fruit size and with the use of potash fertilizers. These measures might be expected to increase fruit acidity. Other troubles briefly mentioned are mealy bugs and wilt; terminal mottle, the cause of which is uncertain; nematodes; heart rot (*Phytophthora* sp.) mite (*Stigmaeus floridanus*); pineapple borer (*Thecla* sp.); cripple, a fruit deformity, the cause of which is unknown; fasciation; physiological cork spot; fruitlet core rots (*Penicillium* and *Fusarium* spp.); and glassy spoilage caused by several yeasts.

3570. CARTER, W.

Organic phosphates as systemic insecticides on pineapple plants.

J. econ. Ent., 1952, 45: 981-4.

While the 3 phosphates, parathion, systox and malathion, were toxic to the mealy bug *Pseudococcus brevipes* as

contact insecticides, translocation, especially to the older portion of the plant, did not occur in sufficiently toxic quantities. The reason may be the change of pH value in the pineapple leaf tissue which, early in the morning, may be as low as pH 3.4, while the stem tissue is fairly constant at pH 5.2 ± 0.2.

3571. WOLFENBARGER, D. O.

Systox, a systemic insecticide for pineapple mite control.

Proc. Fla St. hort. Soc. for 1952, pp. 197-9, bibl. 2, illus., being *J. Ser. Fla agric. Exp. Stat.* 114.

Dipping pineapple planting stock in systox, at one quart or more per 100 gallons of water, gave complete control of the pineapple mite up to five months after treatment. Spraying or drenching plants in beds with systox concentrations of one pint to one gallon systox per 100 gallons of water gave poor control or none at all. Systox dips were more effective than dips of parathion or parathion combined with wettable sulphur. This material has not been approved for use on pineapple plants. [Author's summary.]

3572. GINSBURG, L.

Cold-storage tests to determine shipping temperatures for pineapples.

Fmg S. Afr., 1953, 28: 85-91, bibl. 2.

In two seasons' tests conducted at various temperatures with the Queen and Cayenne pineapples it was found that both varieties store best at 47.5° F. It was also shown that the development of waterlogged tissue in the fruit, often referred to as injection, is not a cold storage injury, as hitherto believed. In the case of Queen the trouble was due to picking too early (25% yellow) and to some unidentified, cultural faults. Fruits from one farm were entirely free from "injection" and those from another severely affected, although both lots were harvested at the same stage of maturity and stored under identical conditions. The effect of cultural factors on storage quality should therefore be thoroughly studied. The condition of the fruit after 21 days' cold storage and 9 days' ripening at 55° F. is also recorded.—West. Prov. Fruit Res. Stat., Stellenbosch.

Rubber trees.

(See also 3287-3294, 3627h, j, r, 3690.)

3573. FERWERDA, F. P.

A possible explanation of the divergence between juvenile type budgrafts and their seedling mother trees in hevea. [Dutch summary 3/8 p.]

Euphytica, 1953, 2: 15-24, bibl. 16.

In 1930 and 1931 when seedlings derived from crosses between the best hevea clones in Indonesia were 8-10 months old, bud patches were taken from them and worked on illegitimate seedlings of similar age. These buddings are described as "juvenile type" (JT)-buddings to distinguish them from "mature type" (MT)-buddings in which budwood is taken from mature rubber trees. Observations and records of growth and yield were made on the seedlings and their JT-buddings until 1941 when the war intervened. In growth habit the JT-buddings with typical conical stems were intermediate between MT-buddings with columnar stems and

seedlings. The bud union was difficult to find after 3 years, indicating close compatibility between stock and scion. Both in growth (girth) and yield the JT-buddings were below the seedlings, but the gap between the 2 types of tree had been narrowed by the 4th or 5th year of tapping. In 24% of the cases, however, the JT-buddings yielded as much as, or more than, their mother trees. It is thought that differences between JT-buddings and their seedling mother trees may be due in fact to the operation of grafting and in part to the effect of the foreign root system. It is not yet certain whether the seedling growth habit of JT-buddings can be perpetuated when budwood taken from them is propagated in the usual way, but in a preliminary trial, abandoned because of the war, the impression was gained that trees developing from main-axis budwood had the stem shape of seedlings, whereas those developing from branch budwood had columnar stems. These results are discussed in the light of experience elsewhere on juvenility in hevea or other plants and with reference to the need for the development of improved hevea rootstocks on which selected clones may develop to best advantage.

3574. RUBBER RESEARCH INSTITUTE OF MALAYA,

Prang Besar 86 as a seed parent.

Plant. Bull. R.R.I.M., 1953, No. 5, pp. 42-6.

Experience with Prang Besar 86 as a seed parent shows that (1) the clone is extremely fertile, (2) the progeny are below average in yield and vigour, and (3) in certain crosses a proportion of yellow-leaved seedlings appear which develop into inferior trees. It is recommended that no seed should be accepted for planting which has over 15-20% P.B. 86 progeny in it.

3575. RUBBER RESEARCH INSTITUTE OF MALAYA,

Stump planting.

Plant. Bull. R.R.I.M., 1953, No. 6, pp. 50-6.

The pros and cons of stump planting are set out, and the following subjects discussed: nursery layout and manuring, cutting back, pulling (removal from the bed), packing for despatch, preplanting treatment, planting, manuring in the field, and after-care.

3576. RUBBER RESEARCH INSTITUTE OF MALAYA,

A new legume bush cover plant, *Flemingia congesta*.

Plant. Bull. R.R.I.M., 1953, No. 5, pp. 39-41, illus.

Flemingia congesta is a deep-rooting, dense, compact bush branching from ground level and attaining 10 ft. in height. It grows vigorously in the open, competes with but does not suppress *Imperata cylindrica*, and combats some creepers. When well established it will survive for some time under maturing rubber when the canopy has become dense. It sets abundant seed, but if seed is wanted spraying with an insect deterrent is necessary. In new clearings or replantings, seed should be sown at 3 × 2 ft., 3-4 seeds per point.

3577. RUBBER RESEARCH INSTITUTE OF MALAYA,

Annual Reports for 1949-51 of the Pathological Division of the Rubber Research Institute of Malaya, 1953, pp. 50+34+34, illus.

These three reports issued together cover: diseases of the root system, diseases of the tapping panel, secondary leaf fall, leaf diseases of young plants,

defence against South American leaf blight, stem and branch diseases, injuries of non-parasitic origin, termites, cockchafers, mites, other insect pests, nematodes, other animal pests, root nodule bacteria. [See abstracts below.]

3578. RUBBER RESEARCH INSTITUTE OF MALAYA.
Injuries of non-parasitic origin. Wound treatments.

A.Rs Path. Div. R.R.I.M. 1949-51, 1953, pp. 25-6 (1950), 26-8 (1951).

In 1951 Standard Vacuum Product 2295-C and an asphalt-kerosene mixture which had been the 2 best of 11 products tested in 1950 were given a large-scale trial against 7 other products. The final assessment was carried out 6 months after application by which time the 2 best had induced complete regeneration of bark. The 3 petroleum greases, S/V Product 2295-C, Shell Ensis 352, and Shell Otina C were the best. Bituminous solutions were inferior.

3579. RUBBER RESEARCH INSTITUTE OF MALAYA.
Diseases of the root system.

A.Rs Path. Div. R.R.I.M. 1949-51, 1953, pp. 4-15 (1949), 5-10 (1950), 4-12 (1951).

(1) *Growth, pathogenicity and dispersal of the 3 major root parasites. Influence of age and vitality of host.* Intact roots of 6-year-old trees were less resistant than those of 20-year-old trees to invasion by *Fomes lignosus* and *F. noxius*, and moribund ones were less resistant than actively growing ones to *F. lignosus*; *F. noxius* and *Ganoderma pseudofeuerreum* were clearly less effective parasites than *F. lignosus*. (2) *Root disease control studies. Rate of loss of infectivity by diseased root fragments.* Irrespective of parasite relatively short fragments remained infectious 2 years after the experiment began; after this period *F. noxius* was slightly less persistent than *F. lignosus*, and *Ganoderma* was the most persistent. *Stump poisoning methods.* The most effective of the 4 methods tested was that in which the poison (15 oz. Na arsenite per stump in the form of 10 lb. to 1 gal. water) was introduced through 1-inch auger holes bored from the outside of a high-cut stump inward and downward over the lateral roots. *Tolerance to arsenic.* *F. lignosus* was the most tolerant, *Ganoderma* intermediate and *F. noxius* the least tolerant.

3580. RUBBER RESEARCH INSTITUTE OF MALAYA.
Diseases of the tapping panel.

A.Rs Path. Div. R.R.I.M. 1949-51, 1953, pp. 16-19 (1949), 10-13 (1950), 12-14 (1951).

Ceratostomella fimbriata (mouldy rot).—In field tests phylon, thiram and octyl cresol in palm oil were ineffective; V.P. 2295-IA in diesoline caused bark burn. Fylomac 90 (fixanol V.R. plus 10% gentian violet) and Ialine white disinfectant (a new tar acid emulsion) were effective. *Phytophthora palmivora* (black stripe).—P.B. 86 is more susceptible than most clones in Malaya.

3581. RUBBER RESEARCH INSTITUTE OF MALAYA.
Mouldy rot.

Plant. Bull. R.R.I.M., 1953, No. 6, pp. 57-60, illus. (reprints available, superseding *Adv. Leaf. P/AL 2* (50)).

Notes are given on the symptoms, spread, prevention and cure of mouldy rot (*Ceratostomella fimbriata*). Preventive measures are the resting during the wet

months of trees particularly liable to infection (e.g. in low-lying sites or adjacent to infected areas), keeping undergrowth under control during the rainy season, and ensuring the cleanliness of tapping knives. Fungicides officially approved for the control of mouldy rot are fylomac 90 (recommended concentration 0.28%), killgerm (5-10%), paragerm (5-7½%), izal (3-5%), black cyllin (5-10%), ioline white disinfectant (5-10%), ioline ordinary disinfectant (5-10%), white septol (5-10%), brunolinum plantarium (10-15%), agrisol (ordinary) (15-25%), and kilsol red (5-10%). Fylomac is water-soluble and the rest are water-miscible. For preference the fungicide should be sprayed (not painted) on in a broad band two-thirds above and one-third below the cut. Up to 12 applications may be needed and under alternate day tapping these should be made on non-tapping days, scrap being removed beforehand. Control is easier, however, if the trees are taken out of tapping; in this case spraying should be done every 4 days.

3582. RUBBER RESEARCH INSTITUTE OF MALAYA.

South American leaf blight of rubber.

Separate in *Plant. Bull. R.R.I.M.*, 1953, No. 5, pp. 4, illus.

A short description with coloured illustrations is given of the symptoms of South American leaf blight, the highly destructive disease caused by *Dothidella ulei* which is at present confined to South and Central America.

3583. RUBBER RESEARCH INSTITUTE OF MALAYA.
Secondary leaf fall.

A.Rs Path. Div. R.R.I.M. 1949-51, 1953, pp. 19-22 (1949), 13-17 (1950), 14-16 (1951).

Incidence of associated parasites. The percentages of cases in which the following 4 parasites were present in the 4 years 1948-51 were: *Oidium heveae*—89, 95, 94 and 90%; *Hemitarsonemus latus*—68, 35, 73 and 69%; *Gloeosporium alborubrum*—27, 31, 40 and 20%; *Scirtothrips dorsalis*—not quoted, 15, 31 and 15%. *Clonal resistance.* In an experiment in 1950 Avros 50 and B.D. 5 were much more susceptible (39% and 40% canopy lost) than Pil. B. 84 and Tj. 1 (both 4%).

3584. RUBBER RESEARCH INSTITUTE OF MALAYA.
Termites. Mites. Other insect pests: Hemiptera: *Saissetia nigra*.

A.Rs Path. Div. R.R.I.M. 1949-51, 1953, pp. as shown below.

Termites, pp. 39-42 (1949), 26-9 (1950), 28-30 (1951). Three methods of chemical control were compared: (1) the crater method using cymag and Na silicofluoride, (2) the trail injection method using white arsenic, and (3) the liquid method in which a 1% mercuric chloride solution is poured into a runnel round the base of the tree. The trail injection method was the cheapest and was at least as effective as the liquid method but it can cause bark burn and requires skill and special apparatus. The liquid method which causes no injury and requires no special apparatus or skill is recommended. *Mites*, pp. 30-1 (1951). Pestox 3H showed some promise for the control of the yellow tea mite, *Hemitarsonemus latus*. *Other insect pests: Hemiptera: Saissetia nigra*, p. 46 (1949). Six weekly applications of 2.5% Shell white oil and of 0.03% fosferno 20 gave satisfactory and equally good control.

3585. RUBBER RESEARCH INSTITUTE OF MALAYA.

Insecticides.

A.Rs Path. Div. R.R.I.M. 1949-51, 1953,
pp. 48-9 (1949).

The effects of acid serum, fresh and ammoniated latex, all at 0.2%, and of 0.5% slaked lime on the tenacity of a 0.5% lead arsenate spray were compared. Final conclusions cannot be drawn, but (1) lime actually reduced the initial deposit, and did little to improve tenacity (32% retention compared with 28% in the control), and (2) fresh latex alone brought about a positive result, giving the best initial deposit and the best retention (41%).

3586. RUBBER RESEARCH INSTITUTE OF MALAYA.

Latex anticoagulants.

Plant Bull. R.R.I.M., 1953, No. 6, pp. 61-2,
(reprints available, superseding *Adv. Leaf.*
C/AL 15 (52)).

Brief notes are given on the preparation and use of anticoagulant solutions of sodium sulphite (which is applied at the rate of about 0.05%), ammonia (0.01%) and formalin (0.02%).

3587. RESING, W. L.

Conservering van latex gedurende korte tijd.
(The short-term conservation of latex.)
Bergcultures, 1952, 21: 523-7, bibl. 3, being
Ber. I.N.I.R.O. 206.

Results are reported of experiments on the use of formaldehyde and of various chemicals in combination with borax for preserving hevea latex for 1-2 days.

3588. RISDON, E. J., AND OTHERS.

Determination of the dry rubber content of natural rubber latex. Part I. Methods for ammoniated latex. Part II. The effect of ammoniation and storage on the dry rubber content of field latex.

Quart. Circ. Ceylon Rubb. Res. Inst., 1952,
28: 3-6, bibl. 5, and 7-14, bibl. 4.

(1) Natural rubber latex is sold in Ceylon on the basis of its estimated total dry rubber content (d.r.c.). Some time ago the use of the British Standards Institution's method for the determination of the d.r.c. of freshly preserved latex was agreed upon, but it is not clear from the specification whether 0.5% or 2% acetic acid should be employed. Tests did not show a significant difference between the 2 methods but there was evidence that latex samples may respond differently to them. (2) An investigation was made into the problem of how far the d.r.c. determined by the "Estate's method" on fresh latex reflects the d.r.c. of the same bulk of latex shortly after ammoniation. The results—which are tentative like the last—showed no evidence of a rapid or significant decrease in the d.r.c. of fresh latex in the 3-5 day period following ammoniation to 0.5% by ammonia solution, or of a significant difference between the d.r.c. of fresh latex and of latex 24 hours after ammoniation.

3589. PHILPOTT, M. W., AND SEKAR, K. C.

Determination of volatile fatty acids in natural rubber latex.

J. Rubb. Res. Inst. Malaya, 1953, 14: 93-107,
bibl. 11, being *Commun.* 281.

It is shown that a substantial proportion of the acids formed in latex during natural degradation can be

distilled in steam and that these volatile acids consist mainly of acetic acid. It is suggested that a test of spoilage based on the estimation of these acids would not have the disadvantages of the KOH titration method. A quantitative method of determining the volatile acids has been worked out.

3590. HEINISCH, K. F.

Enquête sur la teneur en impuretés du caoutchouc naturel. (Enquiry into the impurity content of natural rubber.)

Rev. gén. Caoutch., 1953, 30: 228-31, illus.

Impurities in inferior quality rubbers have become a serious problem in recent years. In an attempt to find a solution the Institut Indonésien de Recherches sur le Caoutchouc (INIRO) sent a questionnaire to consumers all over the world. From the replies it is plain that owing to the great diversity of the uses of rubber the industry cannot yet define its needs in respect of purity.

3591. V. D. BIE, G. J.

Verbetering van de bevolkingsrubber in Indonesië. (Improving native rubber in Indonesia.)

Rubber, 1953, 9 (1): 1-3, illus., from abstr.
in *Trop. Abstr.*, 1953, 8: 262.

The disadvantages of native rubber from Indonesia are the quantity of impurities it contains, its inferior packing and lack of uniformity. Recommendations are made for improvements in the remilling process, the establishment of small, decentralized production units, packing in Indonesia instead of Singapore and legislation concerning quality.

3592. CONSTABLE, D. H.

Testing of tree killing substances on *Hevea brasiliensis*. I.

Quart. Circ. Ceylon Rubb. Res. Inst., 1952,
28 (1/2): 26.

Inconclusive experiments are reported with the N butyl esters of 2,4-D and 2,4,5-T separately and in mixture plus a mixture of 2,4-D and 2,4,5-T and also a sodium chloride mixture (with an anti-fire additive).

Sugar cane.

(See also 2998, 3627e, m, p, y, 3669, 3685.)

3593. FREELAND, E. C.

The sugar industry of Peru.

Sugar J., 1953, 15 (11): 14-18, 22-3, 40.

This account includes information on climatic conditions, sugar production (489,873 metric tons in 1951), varieties (75% P.O.J.2878), cultural methods, irrigation, manuring, pests, harvesting, factories, yields and by-products.

3594. HILADO, A.

The economics of sugar cane farming. IV.

Sugar News, 1952, 28: 588.

A formula is presented by which the total cost of farming per ha. exclusive of milling costs can be calculated from five known or estimated factors, viz. the net price of sugar per picul, the planters' net milling share, the yield in piculs per ha., the milling cost per picul, and the margin of profit proposed. [See also *H.A.*, 23: 2311.]

3595. MAURITIUS.

22nd Annual Report of the Sugarcane Research Station, Mauritius, 1951, 1952, pp. 37, 75 c.

Cane breeding. Three new variety trials have been planted including M.296/41, M.311/41, M.126/41 and M.152/43, the controls being M.134/32 and Ebene 1/37. 59 trials were harvested: (a) B.3337 gave the highest yield among Barbados varieties but its sucrose content is below that of M.134/32 and its juice quality tends to be poor; B.34104 is a good all-round cane which ratoons well and has good juice; (b) M.213/40 has an inferior juice offsetting a higher yield; (c) M.423/41 appears to be a sound ratooner but in 1951 its juice was inferior to that of M.134/32; (d) Ebene 1/37 is a good ratooner with excellent juice and has been released for distribution; (e) promising new M. varieties were M.11/43 and M.31/45; (f) the old B.H.10/12 gave as good results as M.134/32 in similar circumstances. Juice injection and auxin application gave negative results in control of arrowing experiments. *Chemistry Division.* Estates fertilizer trials show that: (a) N gives a big response; (b) available P and K status is ordinarily good; (c) pen manure at planting is not beneficial when normal fertilization is given. CCS figures suggest a slight increase from K application and show a definite increase from N. In lime and magnesia trials Ca gave a positive and Mg a negative yield response; Ca had no effect on CCS percentage but Mg may cause slight improvement. In a permanent trial M.423/41 again outyielded M.134/32 at high fertilization. Crushed basalt continued to induce increased yields. Whereas in fertilizer experiments yield increases are primarily due to healthier and bigger canes with correspondingly bigger leaves, increase with basalt is chiefly due to more canes per arpent. In foliar diagnosis the mineral contents below which a yield increase is to be expected after fertilization are: N 1.65%, dry matter of leaf punch, P_2O_5 0.45%, and K_2O 1.45%. *Botany Division.* In a test in which response to root pruning was used as a measure of resistance to *Clemora smithi* grubs, M.134/32 showed more resistance than B.3337 and B.37161, and was similar to B.37172. Aretan and Agaloll gave equal control of pineapple disease. Investigations were made of the yield effects of interplanting food crops with sugar cane.

3596. COIMBATORE.

Sugar Cane Breeding Station, Coimbatore. Annual Report for the year 1949-50. *Sci. Reps Indian agric. Res. Inst. for 1949-50*, 1952, pp. 51-9.

Physiological studies. Photoperiodic, manurial and irrigation treatments were tested in 1949-50 for bridging the gap in flowering dates between early and late varieties and for inducing flowering in non-flowering varieties of sugar cane. *Photoperiodic.* With a 24-hour day the early Co.285 and Co.421 flowered as late as December, but there was a decrease in flowering percentage. Continuous treatment for 56 days gave better results than for 146 days. Mild treatment with defoliation and root pruning increased the flowering percentage in Co.421. *Manurial.* More than 150 lb. N per acre tended to delay flowering and decreased flowering percentage, but up to 300 lb. N caused little delay in flowering in Co.285 and Co.421. 100 lb. N plus 280 lb.

P_2O_5 induced considerable lateness in Co.285 and extended flowering until April. Late varieties did not flower under treatment. In pot experiments stable manure tended to induce flowering; and smudging plus photoperiodic treatment advanced flowering 20 days. *Irrigation.* Waterlogging did not induce flowering in the non-flowering Co.442 and B.3013. Traumatic disturbances delayed flowering in Co.285, Co.421 and Co.745.

3597. HERBERT, L. P., AND MATHERNE, R. J.

An analysis of results of field tests of important sugar cane varieties during recent years.

Sugar J., 1953, 15 (11): 24-7, bibl. 9.

The sugar yields of 8 C.P. varieties and Co.290, which together accounted for over 92% of the Louisiana sugar acreage in 1952, are compared for plant and first ratoon crops in 6 locations for the period 1949-1951, inclusive. The relative yields of plant and first ratoon crops of 6 varieties at 5 stations are also compared over 8 years with those of C.P.29/116, selected as standard because of its known stability in productive capacity. The results show that some varieties, such as C.P.34/120, deteriorate in performance over a period of time whereas others remain steady.

3598. DE SORNAY, A.

La canne à sucre M.134/32. (Sugar cane variety M.134/32.)

Rev. agric. Maurice, 1953, 32: 5-11.

M.134/32 is a P.O.J.2878 \times D.109 cross made at Pamplemousses Experimental Station in 1932. In 1952 98% of the Mauritius cane areas were under this variety. Its good qualities are (1) good rooting of cuttings and the speed with which regrowth covers the soil, (2) vigorous growth, which ensures high yields, and good tillering powers, (3) high sucrose content, (4) resistance to cyclones, (5) resistance to drought, (6) tolerance to *Phytalus* (= *Clemora*), and (7) resistance to disease.

3599. VALLANCE, L. G., AND LEVERINGTON, K. C.

The effect of krilium on some sugar cane soils.

Cane Grs' quart. Bull., 1953, 16: 117-20, illus.

Preliminary laboratory tests showed krilium to have a very marked effect on aggregation in 2 clay soils, but little or no effect in a third. Field trials are to be carried out when sufficient supplies of krilium become available.

3600. RAHEJA, P. C., AND SINGH, D.

Growth studies in *Saccharum officinarum*.

IV. Tillerling in relation to cane weight.

Indian J. agric. Sci., 1952, 22: 139-49, bibl. 7.

Studies were conducted on Co.312 at the Agricultural Sub-station, Karnal, to determine how far the weight of cane is influenced by the size of stool and whether total weight per stool decreased or increased with an increase in the number of tillers. A statistical analysis of the data shows that (1) there was a tendency to increase in weight with increasing number of tillers and (2) in plants with more than 5 tillers the weight per tiller is significantly higher than in plants with fewer than 5 tillers.

3601. LOCSIN, C. L.

Preliminary irrigation experiment No. 116
(51-2) at the VMC nursery grounds.

Sugar News, 1953, 29: 55-68.

The effect of irrigation on the sugar cane variety H37-1933 under various fertilizer treatments was studied on a clay soil, previously limed, at the nursery grounds of the Victorias Milling Co., Philippines. The cane was planted in September, 1951, and harvested about a year later. Water equivalent to 50% available moisture in the soil was supplied when the average readings of moisture meters at one- and two-foot depths fell below 50%. The fertilizer rates were 249/50/80 N/P₂O₅/K₂O kg. per ha., 80/100/120 and 80/100/nil. The yields under the 3 treatments, with and without irrigation, were: heavy N—242, 126 piculs sugar per ha.; normal fertilization—224, 156; nil-K fertilization—161, 147.

3602. RAO, N. V. M., AND NARASIMHAM, R. L.

The nitrogen nutrition of sugar cane.

Madras agric. J., 1952, 39: 243-55, from abstr. in *Soils and Ferts*, 1953, 16, No. 739.

Analysis showed that the maximum need of N is in plants 2½-5 months old. The N becomes available 1½-2 months after application, and late applications lower the quality of the crop.

3603. LAL, K. N., RAO, M. S. S., AND DE, R.

Nutrient effect upon chlorophyll content of sugar cane leaves.

Proc. nat. Inst. Sci. India, 1952, 18: 603-19, from abstr. in *Soils and Ferts*, 1953, 16, No. 737.

In pot experiments N at a rate equivalent to 100 lb./acre significantly raised chlorophyll content, but 37.5 or 75 lb./acre P₂O₅ or 25 lb./acre of K₂O decreased it. With double this amount of K₂O there was a slight increase. In sand cultures with different combinations and levels of N, P and K, optimum applications were 20 p.p.m. each of N and P₂O₅ and added K was deleterious. Fish guano was superior to bone meal, dried blood or castor cake, and NaNO₃ was superior to "Niciphos", cyanamide, KNO₃ or (NH₄)₂SO₄ in promoting chlorophyll formation during early growth. At later stages bone meal and KNO₃ were the most efficient organic and mineral fertilizers respectively. At both stages the average action of mineral fertilizers was greater than that of organic materials. Chlorophyll formation was satisfactory when the N:P:K ratio was 33:28:5. Luxury consumption of P and K occurred when proportions of either were raised, and N-deficiency symptoms were induced by reducing the proportion of N. A total salt concentration of 60 p.p.m. or somewhat higher was beneficial to chlorophyll formation, provided N was not below 33% of the total. The highest chlorophyll content resulted when N formed 50-66% of the total NPK supply. Field experiments in general confirmed the results of pot experiments.

3604. UTTAR PRADESH DEPARTMENT OF AGRICULTURE.

Ratooning in sugar cane.

Agric. Anim. Husb. U.P., 1950, 1 (1): 37-9 and [Publ.] Dep. Agric. U.P., pp. 3.

Ratooning experiments begun at the Government

Seed Farm at Kalai in the Aligarh district in 1939 show that ratoons should be kept only for one year and that they must be manured, irrigated and cultivated in the same way as plant cane. A manured (but not an unmanured) first ratoon is more profitable than a plant cane crop. Manured ratoons provide cane of better quality than plants for crushing early in the season and this extension of the crushing season is a factor of great economic importance to the industry. The cost of manuring first ratoons is amply justified by the increased yield (653 maunds compared with 313 unmanured). Ratooning for more than one year is unprofitable owing to the increased incidence of pests.

3605. AGARWAL, R. R.

Summary of work done on manuring of crops in the U.P.

Agric. Anim. Husb. U.P., 1951, 6 (3): 32-9

[received 1953].

A summary is given of manurial studies on sugar cane (among other crops) since 1936. *NPK requirements*. N is always required, P is required on some soils including clayey ones, and K is not required. *Different N manures and fertilizers*. At Shahjahanpur various bulky and concentrated manures at 100 lb. N per acre were compared for 4 years and results were variable, but molasses was among the best; in another experiment molasses at 50 lb. N per acre gave higher yields than a number of oil cakes at 100 lb.; in another experiment in which farmyard manure and sulphate of ammonia alone and together were compared the farmyard manure gave a poor response. At Kanpur castor cake and mustard cake alone gave the highest yields and were significantly better than sulphate of ammonia alone. At Bubhnowlie an inorganic mixture (sulphate of ammonia and niciphos), in which all the N was applied at earthing up, was better than a standard mixture (castor cake and superphosphate), in which more than half the N was applied at planting. *Green manuring* has been established as sound practice for irrigated crops such as sugar cane. At Shahjahanpur *Crotalaria juncea* proved to be the best green manure, followed by "lobia" beans and *Cyamopsis psoraloides*; the crotalaria should be ploughed under when 60-90 days old. At Gorakhpur supplementing the green manure with artificials increased yields.

3606. PEARSON, C. H. O.

Overhead spray irrigation trial.

S. Afr. Sugar J., 1953, 37: 89-91.

In a preliminary, non-replicated trial at Chaka's Kraal with plant canes of N:Co.310 on a shale soil 11.69 inches sprinkler irrigation gave very promising results (46.73 tons per acre) when applied at ½ in. per week in dry periods, compared with 12.52 inches furrow irrigation (36.11 tons), applied at 3-week intervals, and no irrigation (an estimated 15 to 20 tons). Total rainfall during the period was 34.68 in. The sprinkler irrigated plot matured within 12 months of planting. Further trials are in progress.

3607. HUGHES, C. G.

The diseases of *Saccharum* in New Guinea.

Tech. Communs Qd Bur. Sugar Exp. Stats 1/2, 1953, pp. 1-21, bibl. 27, illus.

A shorter account of the observations recorded here appeared earlier [see *H.A.*, 23: 1342]. The diseases, old

and new, described include downy mildew (*Sclerospora* sp.), eye spot (*Helminthosporium sacchari*), yellow spot (*Cercospora kopkei*), pokkah boeng (*Gibberella fujikuroi*), Fiji disease and mosaic, rind disease (*Pleocyta sacchari*), red rot (*Physalospora tucumanensis*), rust (*Puccinia kuehnii*), *Schizoplyllum* rot (*S. commute*), red rot of the leaf sheath (*Sclerotium rolfsii*), banded sclerotial disease and 4 unknown diseases.

3608. STEINDL, D. R. L., AND HUGHES, C. G.

Ratoon stunting disease.

Cane Grs' quart. Bull., 1953, 16: 79-95, illus.

The main symptoms of this disease, first observed in Queensland on Q.28 in 1945, are stunted growth, particularly in ratoons, and a discoloration of vascular bundles in parts of the stem. In 5 trials in which sets taken from healthy and diseased fields were planted, the plant crop from the latter showed yield losses of 4·3 to 10·7% and the first ratoon crop losses of 7·0 to 20·3%. Several other varieties are also very susceptible. It is suspected that the disease occurs in other countries besides Australia. The evidence to date suggests that a virus, which can be readily transmitted mechanically, is responsible. Suggested control measures include the use of disease-free planting material, preferably taken from ratoon crops, and measures to prevent mechanical transmission. In addition, heat treatment has proved effective, using hot water at 54° C. for 1 hr or at 52° C. for 1½ hrs, or hot air at 54° C. for 8 hrs or at 50° C. for 24 hrs. The use of resistant varieties does not appear at present to offer much promise.

3609. BUZACOTT, J. H.

Insects associated with sugar cane in New Guinea.

Tech. Communs Qd Bur. Sugar Exp. Stats 1/2, 1953, pp. 23-30, bibl. 9.

Notes are given on the insects seen to be associated with sugar cane during the 1951 New Guinea cane-collecting expedition.

3610. MOUTIA, L. A.

Notes sur *Apanteles sesamiae* Cam., un nouveau parasite de *Sesamia calamistis* Hamps. à Maurice. (Notes on *Apanteles sesamiae*, a new parasite of *Sesamia calamistis* in Mauritius.)

Rev. agric. Maurice, 1952, 31: 269-71, bibl. 2.

Following successful laboratory tests, colonies of 1,500-2,000 *Apanteles sesamiae* were released in various parts of the island. Two months later parasitized caterpillars of the sugar cane pink borer, *Sesamia calamistis* (= *S. vutaria*) were found in 3 localities.

3611. PARTHASARATHY, S. V., PRAKASAM, P., AND KRISHNAMURTHY, C. S.

Green muscardine fungus on *Pyrilla* sp. *Curr. Sci.*, 1953, 22: 85-6, bibl. 2.

In the South Arcot District the fungus *Metarrhizium anisopliae* occurs on the sugar cane pest, *Pyrilla* sp. The economic importance of the parasite is being studied at the Sugarcane Research Station, Anakapalle.

3612. AGARWALA, S. B. D.

Effect of benzene hexachloride on growth of sugarcane.

Curr. Sci., 1953, 22: 19-20, bibl. 5, illus.

In pot trials at Pusa, BHC containing 5·5% gamma isomer mixed at the rate of 10 p.p.m. of soil resulted in the development of normal though shortened roots from sets of Co.453. With higher dosages of 50, 100, 200 and 400 p.p.m. BHC the roots became fewer and much shorter and showed tips swollen into club-shaped woody structures. At the 3 highest concentrations the plants dried up after producing 2 to 4 leaves, and at 50 p.p.m. they dried up after 24 weeks.

3613. BUZACOTT, J. H.

The burning question.

Cane Grs' quart. Bull., 1953, 16: 122-3, illus.

Among some newer varieties which shed their trash freely overheating is liable to occur during burning, leading to lodging. In such cases it is advisable to burn late in the evening or early in the morning when there is dew on the trash.

3614. ANON.

Transhipping cane loads. A review of some interesting devices.

S. Afr. Sugar J., 1953, 37: 17-21, illus.

Some of the methods developed by growers in Natal for transhipping cane are described. They include the use of cranes and gantries and of special trailers carrying golovans (light railway trucks).

Tea.

(See also 3627 l, n, 3634, 3681.)

3615. SOČAVA, V. B.

The work of the Botanical Institute V. L. Komarov of the Academy of Sciences of the U.S.S.R. for the development of tea cultivation in new regions. [Russian.]

Bot. Zurnal, 1953, 38: 155-64, bibl. 1, illus.

Chiefly in Zakarpatje [Transcarpathia, south-western part of the Soviet Union bordering Czechoslovakia and Rumania], where attempts are being made to establish tea cultivation in the valleys and foot-hills of the Carpathian mountains.

3616. NYASALAND PROTECTORATE.

Tea.

A.R. Nyasaland Dep. Agric. 1951, 1953, pp. 15-22.

Notes are given on a number of experiments. *Time of harvest and freshness of seed*. Freshly harvested seed was sown at weekly intervals from April to June. The percentage germination appeared to drop as the season progressed. *Pruning*. The green leaf yields for 1951 under 6 treatments (expressed as percentages of the yield under annual clean prune) were annual clean prune 100, annual cut-across prune and annual cut-across prune plus cleaning out centre of bush both 98, biennial cut-clean prune 94, biennial cut-across prune 86, and triennial clean prune 108. Results over the previous 9 years showed that an annual clean prune gave significantly less crop than a biennial or triennial clean prune, there being no significant difference between the 2 latter cycles; cut-across and centering gave significantly less crop than clean prune; when original soil fertility was high, cut-across yielded higher than clean-prune but in time the latter overtook the

former and yielded a significantly greater total. *Tipping*. A comparison of tipping at 4, 6 and 8 in. was started on newly pruned tea in September, 1950, the first tipping being made in September and the plucking table being finally formed about November. During the formative phase a significant amount of crop was lost for each upward step in tipping height, but subsequent tipping differences were insignificant. *Plucking*. 6-, 10- and 14-day plucking rounds were compared through the main season crop (November-April); 3 leaves and a bud were taken and the remainder broken back to the janum (fish leaves). A significant loss in crop occurred for each 4-day increase. From January to April each extension also caused a significant increase in break-back. Leaf plus breakback for the 6-day round was significantly greater than for the other two, which were similar. *Manuring*. In one trial on mature Indian tea, each lb. N up to 70 per acre gave a 3.5 lb. increase of made tea. In another experiment 4-year-old Indian tea received 0, 80, 160 and 240 lb. N per acre as sulphate of ammonia. The highest rate gave a non-significant increase in crop over the nil rate. In a third experiment there were no significant yield differences when 80 lb. N per acre was applied in 4 time-groups. *Spacing*. Spacings of $3\frac{1}{2} \times 3\frac{1}{2}$, 4×4 , $4\frac{1}{2} \times 4\frac{1}{2}$ and 5×5 feet were compared in a trial begun in 1938. Green leaf yields for the past season were 10,843, 10,017, 9,796 and 8,474 lb. per acre respectively. Conclusions drawn from the 9 years' cropping are that increasing the plant population per acre (1) increases the crop, (2) reduces individual bush yield, and (3) pays economically.

3617. DE GEUS, J. G.

Blisterblightbestrijding bij, en enkele meer algemene bijzonderheden over de theecultuur op Ceylon en in India. (Blister blight control and other general considerations on tea growing in Ceylon and in India.)

Arch. Theecult., 1952, 18*: 99-113, illus.

Tea growing in Indonesia is discussed in relation to observations made in Ceylon, India and neighbouring regions, particularly with regard to the control of blister blight by I, Indirect measures: (1) regulating shading, (2) weed control, (3) degree of pruning, (4) adjusting the pruning cycle; and II, Direct chemical control: (1) the kind of fungicide and (2) methods of application.

3618. REITSMA, J.

Een jaar blisterblight op Java. (A year of blister-blight in Java.)

Arch. Theecult., 1952, 18*: 5-33, illus.

An account is given of the first identification, in April, 1951, of blister-blight (*Exobasidium vexans*) on material from a Javan tea garden. The conditions under which the outbreak occurred were examined, the primary sources of infection determined and the secondary infections noted. The observations indicated that the first incidence must have taken place in January or early February, 1951. The disease spread very rapidly and within 3 months of its first notification it had produced great losses in West Java in young, heavily pruned, shaded tea. Control experiments were instituted in relation to the removal of the shade trees and

* Actually shown without volume number. It has now been decided to revert to volume numbers.

the frequency of spray applications. The costs of the operations (using copper oxychloride as the fungicide) are tabulated.

3619. VAN DER KNAAP, W. P.

Blisterblight-resistie van theeheesters en theeclonen. (Blister blight resistance in tea bushes and tea clones.) [English summary $\frac{1}{2}$ p.]

Arch. Theecult., 1952, 18*: 69-98, bibl. 15, illus.

Following a discussion of work in Ceylon on the selection of tea clones resistant to blister blight, an account is given of investigations in Java. Yields and degree of infection of named susceptible and resistant clones are tabulated. It is concluded that in future new mother bushes must be selected initially for resistance to blister blight, other characters such as rooting capacity, production, and quality, being determined later in clonal trials. Selection will take place among non-infected bushes in heavily infected gardens. Two months before the wet season begins the bushes will be pruned, and the prunings used for budding. The mother bushes will be observed during the wet season and fungicides will not be applied to them. Older clones, selected for yield only, range from very susceptible to highly resistant. There seems to be no close correlation between yield and degree of infection or between yield and quality, but within clones there is high correlation between yield and rate of infection. Susceptible clones are very heavily infected in the wet season. During the dry season there is little difference between resistant and susceptible clones. The determination of the rate of infection must therefore be made in the wet season. It seems possible that the rate of infection depends partly on the tannin content of the tea leaves.

3620. LAOH, J. P.

Een beschouwing over de technische moeilijkheden en economische aspecten van koperstuifpoeders met inheemse draagstoffen bij de bestrijding der blisterblight. (A consideration of the technical difficulties and economical aspects of copper dusts with native diluents in the control of blister blight.) [English summary $\frac{1}{2}$ p.]

Arch. Theecult., 1952, 18*: 35-67, bibl. 8.

Two methods of blister blight control were compared: (1) dusting with a "Whirlwind" motor duster and (2) spraying with pressure-retaining knapsacks, and the results tabulated. On the whole, wet spraying was the more effective and economical on pruned fields. Motor-driven outfits are the most suitable for compact fields in plucking. In Java great difficulties are encountered with the organization of the spraying teams, and many estates are therefore compelled to change to motor dusting, though this method is, under their circumstances, less economical than spraying with knapsacks. Volcanic tuff powder/copper oxychloride (without adhesives) as well as Billiton kaolin/copper dusts give a very favourable distribution of copper. Costs of volcanic tuff are low, about 25 cts./kg. [See also H.A., 23: 1361.]

* Actually shown without volume number. It has now been decided to revert to volume numbers.

3621. HOMBURG, K.

Voorlopige mededelingen over de natte en droge blister-blight-bestrijding op "Sperata/Sinumbra". (Preliminary communication on the wet and dry methods of blister blight control in Sperata, Sinumbra.)

Bergcultures, 1953, 22: 31-9.

An account is given of practical experience in Indonesia on the control of blister blight with a Vermorel-Colibri C knapsack sprayer and a Whirlwind duster.

3622. LAOH, J. P.

De bestrijding van *Helopeltis* met DDT-en andere chloorhoudende insecticiden. (Control of *Helopeltis* with DDT and other chlorinated insecticides.) [English summary 14 lines, Indonesian summary 21 lines.]

Bergcultures, 1953, 22: 84-8, bibl. 3.

Trials in Indonesia have shown that the DDT oil emulsions Supona D and Arkotine D are as effective for control of *Helopeltis* as higher concentrations of DDT wettable powder. They are therefore cheaper and there is less danger of exceeding the toxic residue limit. It is recommended, however, that the same insecticide should not be used continuously. The use of alternative chlorinated insecticides, toxaphene, BHC and aldrin, is considered and it is concluded that BHC in the form of lindane with a local filler would be satisfactory, cheap, and impart no off-flavour to the tea.

3623. ZAPROMETOV, M. N.

Comparative study of the composition of tea tannin by chromatography. [Russian.] *Doklady Akad. Nauk S.S.S.R.*, 1952, 87: 649-52, bibl. 13.

The results obtained show that the composition of the tea tannin changes with the age of the tea plant. As the leaves age, the content of the simple ortho-catechins (l-epicatechin, d,l-catechin) declines, and that of simple gallicatechins (l-epigallicatechin, d,l-gallicatechin) increases, resulting in decreased oxidation capacity of the tannin.

3624. SHRIKHANDE, J. G.

Tannic interference in some biochemical processes.

Agric. Anim. Husb. U.P., 1951, 6 (3): 29-31, bibl. 5 [received 1953].

During studies on the biological decomposition of green manures it was observed that tea leaf, although giving a high negative N-factor, showed no signs of ammonification over a period of 6 weeks despite normal losses of dry matter. Laboratory experiments confirmed that it does not ammonify to the same extent as other green manures of similar N content and that the high negative N-factor must therefore be due to loss of elementary N. Although there is no fear of decomposing tea leaf and tea refuse locking up soil nitrate and thus starving the crop, they, in common with other tannin materials, have an extremely low capacity for producing the mucus which is typical of normal composts and an important factor in the maintenance of crumb structure. This suggests that they should not be used as a sole source of organic matter and that discretion should be used in

combining them with other wastes.—Agric. College, Kanpur.

Sundry crops.

3625. GONZALEZ, L. G., AND ANOOS, Q. A.

The growth behavior of mangosteen and its graft-affinity with some relatives.

Philipp. Agric., 1951 (issued Dec. 1952), 35: 379-85, bibl. 5.

Seed. Fresh seed had a germination rate of 85%. Only 50% of freshly gathered seeds packed in moist sphagnum moss in tightly closed containers were viable after 2 months. Of unpacked seeds or seeds packed in ground charcoal only 22% were viable after 15 days. The average germination period was 19.5 days. *Grafting.* Mangosteen did not unite with rootstocks of *Calophyllum* spp., *Cratoxylon* spp. or *Rheedia edulis*. *Garcinia kydia* and *G. morella* showed compatibility, but the percentages of union were only 10 and 12 respectively. *Marcotting.* Trials invariably failed.

3626. WHITE, E. V.

The constitution of sapote gum. I. Methanolysis of sapote gum methyl ether.

J. Amer. chem. Soc., 1953, 75: 257-9, bibl. 12.

The gum forms slowly in wounds made in the sapote [sapodilla] tree following the collection of chicle. The methyl ether derivative, subjected to methanolysis, yields a syrupy mixture of glycosidic and uronosidic components. The glycosidic components have been separated and identified.

Noted.

3627.

a ANON.

Economic survey of the cocoa producing areas in Nigeria. Interim notes and papers. No. 1. A first analysis of family size, composition and occupational distribution.

BALDWIN, K. D. S.

No. 2. An analysis of cocoa survey records for 23 villages in Ibadan district. *Fm For.*, 1952, 11: 52-9, 59-63.

b ANON.

Some aspects of the cultivation of green manures.

Bull. Indian centr. Coconut Cttee, 1953, 6: 127-30, illus.

Crotalaria striata as a green manure crop for coconuts.

c ANON.

Arabica coffee yields.

Indian Coffee, 1953, 17: 2, reprinted in *Plant. Chron.*, 1953, 48: 105.

Table showing 6-yearly average yields in main coffee districts of India.

d ANON.

The essential oil from the leaves of guava, *Psidium guayava*.

Perfum. ess. Oil Rec., 1953, 44 (2): 46-9, 56, bibl., from abstr. in *Trop. Abstr.*, 1953, 8: 262.

TROPICAL FRUIT AND PLANTATION CROPS

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Eradication campaigns against *Oryctes rhinoceros* described.
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NOTES ON BOOKS AND REPORTS.

Books.

3628. BRAUN, H., AND RIEHM, E.

Krankheiten und Schädlinge der Kulturpflanzen und ihre Bekämpfung. (Diseases and pests of cultivated plants and their control.) P. Parey, Berlin and Hamburg, 7th revised edition, 1953, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 339, bibls. numerous, illus., DM 26.80.

The authoritative character of this textbook, now in its seventh edition, is vouched for by the standing of its authors, one of whom (H. Braun) occupies the chair of phytopathology at Bonn University, while the other is a retired president of the Biologische Reichsanstalt für Land- und Forstwirtschaft. Both the educated grower and the student taking a degree course would seem to be equally well catered for, the former by an arrangement of symptoms in the form of an identification key in the case of each host, the latter by a discussion of the parasites' biology. Both types of potential reader will benefit from the recommendations on control, which try to strike a balance between methods of proved economic value and the latest trends still in the experimental stage. As only 125 pages are devoted to horticultural crops, the number of pests and diseases treated is necessarily restricted. The selection was determined by their economic importance in Germany, which naturally is not always the same as that in Great Britain. We become aware, for instance, that hop growers in Germany are not seriously concerned about *verticillium* wilt or virus, but we note that the fungus *Capnodium salicinum* may become troublesome in hot summers. The tomato root diseases *Colletotrichum atramentarium*, *Thielaviopsis basicola* and *Fusarium* spp. are not mentioned—to quote at random other differences of emphasis in the two countries—whereas a new chapter had to be included on the summer fruit tortricid, *Adoxophyes orana* (*Capua reticulana*), as a major apple pest. The most interesting feature for the British research worker is perhaps the bibliography which, in 636 footnotes, many of them referring to more than one paper, is a valuable introduction to the German literature on plant pathology. The book's copious illustrations with excellent photographs require special acknowledgement.

V.H.G.

3629. BROOKS, F. T.*Plant diseases.*

Geoffrey Cumberlege, Oxford University Press, 2nd edition, 1953, 9×6 in., pp. xii + 457, bibls. numerous, illus., 38s.

In the preparation of this edition, the text of the first, published in 1928 and for some years out of print, was completely re-written by the author, who was Professor of Botany in the University of Cambridge until 1948. The manuscript had already been sent to the publishers when the author's death occurred in March, 1952, just before the proofs were ready. A pathetic and very modest note to this second edition by W. J. Dowson, S. D. Garrett and N. F. Robertson, all former students of his, informs the reader that the author had previously asked for their help in proof reading but the task had, to their sorrow, to be undertaken by them alone. With

his usual perspicacity, the author selected the best possible team. At the end of their short note they state that the text has not been altered and is just as Professor Brooks left it. We are thankful that all the circumstances have allowed the reappearance of the book.

In those earlier days, before the first edition had appeared, there was great need for an up-to-date textbook on plant diseases occurring in the British Isles and elsewhere; Professor Brooks supplied that need and gave short diagnoses and lists of references to original papers. The second edition carries on the good work of the first and is in the same style. The diagnoses and descriptions of diseases are short but adequate and just enough references are usually given to enable the reader to find his way into any particular subject.

The author says in his preface that, because our knowledge of plant diseases has advanced greatly in recent years, this is not only a second edition but virtually a new book. It is, indeed, for new diseases are described and modernization has been effected in nomenclature and in the discussion of cause and control. Fourteen of the 22 chapters are concerned with parasitic fungi and one chapter is devoted to each of the following: Introduction, Non-parasitic diseases, Viruses, Bacteria, Actinomycetes, Plasmodiophorales and Myxomycetes, Green Algae, and lastly, Fungicides. The parasitic fungi, the author's chief interest, are the most adequately dealt with and the remaining chapters provide useful introductions to the other causes of disease and to fungicides; more could not be expected in a book of this size. The arrangement is as before, being based on the classification of the causes of disease and not on the grouping of host plants.

An increase in the text is accomplished by the use of thinner paper, 457 pages compared with 386, and slightly longer lines of type, resulting in a volume not quite so thick as that of the first edition. There is no list of illustrations and the more economical system of reference by asterisk in the general index is again adopted. Only two of the former illustrations have been withdrawn and replaced by others (Figs. 35, 62) and some are additional (Figs. 39a, 52a, 59a). The reproduction of most of the photographs is improved. The type is clear and proof-reading has evidently been most carefully done; in fact the only minor error noticed is where words, accidentally divided, required closing up (e.g. p. 4, p. 127).

Professor Brooks's work is once again welcomed as the latest British textbook; the well-known and battered copies of the first edition may now be honourably retired.

W.M.W.

3630. COUTANCEAU, M.

Arboriculture fruitière. (Tree fruit growing.) J. B. Bailliére et fils, Paris, 1953, $10 \times 6\frac{1}{2}$ in., pp. 557, bibls. numerous, illus., 3,500 Fr.

It may be said with confidence that *Arboriculture fruitière*, the latest publication in the series *Nouvelle Encyclopédie Agricole*, will be of immense value to the French fruitgrower in helping him to evaluate the results of modern research and fit them into the framework of his own economic system. The author, professor of fruit tree culture at the National School

of Horticulture, Versailles, has both feet firmly on the ground and is well aware that the results of research are of no practical value to the grower unless they are interpreted in the light of economics and local conditions. He points out that during the last 20 years there have been fundamental changes in market requirements and availability of labour which have led to new problems of production. In this very efficient textbook, which is subtitled "The technique and economy of rosaceous fruit tree production", he gives a good idea of the way in which research workers and growers are solving these problems.

The book starts with general information on the position of fruitgrowing in France, the structure of the fruit tree, nutrition, the development and physiology of the tree, and environmental conditions. Under the heading propagation the effects of rootstock on scion are analysed in some detail and descriptions are given of the principal stocks used in France for the various fruit tree species. The next chapter on training and pruning is, as might be expected from a French work, the longest in the book. To the uninitiated Englishman many of the tree forms and pruning instructions may seem alarmingly elaborate, but as my Uncle Toby would agree, "There's no disputing against hobby horses". The establishment of a fruit plantation and soil management are dealt with from a soundly practical point of view. Shorter chapters are devoted to plant protection, including protection from frost, fruit thinning, harvesting and storage, topworking, and commercial varieties. At the end of each chapter is a bibliography, the majority of the references being to French work. The numerous diagrams and photographs are mainly of a high standard and to the point.

P.R.-D.

3631. DAVSON, H., AND DANIELLI, J. F.

The permeability of natural membranes.

Cambridge Univ. Press, London, 2nd edition, 1953, 9 x 6 in., pp. 365, bibls. numerous, 30s.

This is a book for specialists only. To anyone wishing to know how substances penetrate the boundaries of living organisms, reference to the relevant chapter will give the facts as they were known when the first edition was published in 1943.

This second edition is hardly more than a reprint of the first, having only brief addenda, at the end of most chapters, containing pointers to the more significant results published since the first edition went to press. The authors note in their preface that a completely rewritten book would have been better than the present arrangement, but as the use of tracer elements and radioactive isotopes has materially altered the nature of what it is possible to determine, the now classical theories put forward in the first edition are in the process of being rigorously tested. Publication of new results now would lead to confusion rather than to clarification, whereas a delay of a further five years may enable a comprehensive statement of the position to be made.

Taking their preface as a hope of better things to come, we must be grateful that the excellent account given in the long out-of-print first edition is now available in a second edition.

F.W.M.L.

3632. ESAU, K.

Plant anatomy.

John Wiley & Sons, N.Y., and Chapman & Hall, London, 1953, 9 1/4 x 6 in., pp. 734, bibls. numerous, illus., 72s.

Written by an author of great practical experience who is an undoubted authority in the field of plant anatomy, this book deals comprehensively with the structure and development of the individual cell, of specialized cell types, of tissues, and finally of plant organs including flowers, fruits and seeds. It is not merely a textbook for teachers and advanced students, for Professor Esau's approach from the standpoint of developmental anatomy, her clear style, and the wealth of magnificent illustrations make it also a most stimulating and eminently readable book. Whenever possible attention is drawn to the relationship between structure and function. The numerous examples are selected from a wide range of temperate and sub-tropical plants, including many of economic importance. Without going into too much detail the author gives the most recent concepts on various, sometimes still controversial, aspects of plant anatomy, and by an extensive bibliography at the end of each chapter enables those interested to refer to the original papers. It is rare to find a book which combines so much detailed information with such breadth of outlook. This should render the book of interest to botanists in general, as well as to the more specialized student of plant anatomy. B.M.

3633. GERARD, G.

Electricity in the garden.

Collingridge, Lond., 1953, 9 x 6 in., pp. 125, bibl. 9, illus., 15s.

The advantages of electricity for soil warming are indisputable in view of the scarcity and high price of manure for hotbeds and the amount of labour required for stoking furnaces with solid fuel. That it is not yet widely used is partly due to the fact that the grower has not yet been properly introduced to electricity, and therefore treats it with a certain amount of suspicion. He may feel he does not know enough about it to instal and maintain the fittings or to make the maximum use of them; he may be afraid of the danger or of the cost. This book, by a highly qualified electrical engineer, is just the introduction that is needed to give the grower knowledge, confidence and, probably, enthusiasm. Mr. Gerard is not trying to sell electricity to the gardener, and he can be relied on to point out its limitations and emphasize its dangers when not properly handled. His intention is to explain the way in which electricity works, the uses to which it can be put in the garden and the equipment that is needed. The first few chapters, in which an outline is given of the elementary principles and explanations of the terms used, will be a help to those who know little about the subject. This introduction, however, is necessarily brief and the reviewer, at least, would have welcomed the opportunity to ask questions.

In dealing with the applications of electricity in the garden the author, as might be expected, gives considerable attention to soil warming in hotbeds, propagating beds, tomato houses and under cloches, but details are also given of a surprising number of other uses. These include air heating in small glasshouses, mushroom houses and frames, frost protection in

larger houses, flood lighting of ornamental features, lighting to stimulate or control plant growth, soil sterilization, automatic control of hydroponic systems, and power for pumping, irrigation, spraying, refrigeration, and driving lawn mowers, hedge trimmers, cultivators, digging machines and various other appliances. Indeed, once an electrical distribution centre has been installed in the garden, the enterprising grower will find countless ways in which he can use it to save labour or simplify operations.

This is not a gardening book proper, and the gardener must not expect to be instructed in his own art. The only place in which cultural practice is dealt with in detail is in Chapter VII, where the amateur production of early lettuce, carrots and tomatoes in an electrically warmed hotbed is described. Here one feels that the author is no longer quite on his home ground. It is possibly purist to question the use of slug bait to "counteract slugs", but gardeners cannot feel satisfied with the statement that the behaviour of carrots is somewhat uncertain but if these "take" the results are usually good. The solution to that problem, however, is the gardener's own concern. It is on the problem of exploiting the labour-saving force of electricity that he is justified in looking for guidance, and this is surely and efficiently given.

P.R.-D.

3634. HAINSWORTH, E.

Tea pests and diseases and their control.
Heffer, Cambridge, 1952, 9 x 6 in., pp. 130,
illus., 18s.

As Dr. Mann states in his foreword, the progress made in our knowledge of the animal and vegetable pests of the tea plant since 1903 has been truly remarkable. Research has been carried out not only in North-East India, but in what is now Indonesia, Ceylon, Indo-China, Africa and, in short, practically everywhere that the tea bush is grown. The results have been published from time to time in numerous journals, and the bringing together of this information from a multitude of sources is long overdue. However, despite the general title of his book, *Tea pests and their control*, Ernest Hainsworth makes no pretence of supplying such a critical review. In fact the book deals entirely with the pests and diseases of N.E. India and the control measures designed to meet the conditions and practices of that area. For that reason the book will no doubt be warmly welcomed by the tea planters of N.E. India as it brings together under one cover so much information of value in their work. Tea planters in other parts of the world will, however, find the book of less value. Those in Ceylon would be surprised to read that shot-hole borer has "more of a nuisance value than of damaging effect" and that "control measures are not normally needed against this curious pest" (p. 18). Planters in Africa will find no information concerning the root disease caused by *Armillaria mellea* other than the statement that it is an important disease of tea in Africa and Java, given in a table of primary root diseases of tea.

Watt, Mann, Petch and others laid sound foundations for later workers in tea pathology to build on. They described the symptoms and recorded the organisms found in common association with the diseases. Later work, however, has demonstrated that unsuitable environmental conditions, drainage, soil acidity and

faulty cultural practices are of greater importance than the associated organisms in causing some, but not all, diseases. Methods of cultural control are therefore of paramount importance and spraying is resorted to only as a last resource. Hainsworth, rightly, has laid considerable emphasis on these aspects, and has given much space to very detailed instructions regarding suitable methods of cultural control for North-East India. There is no bibliography and very few references to literature are given. The illustrations are good. The publishers are to be congratulated on their excellent production.

C.H.G.

3635. HERBERT, D. A.

Gardening in warm climates.

Angus & Robertson, Sydney and London,
1952, 9½ x 6½ in., pp. 245, illus., 30s.

Those parts of the world that are characterized by almost frost-free, dry winters and hot, wet summers provide a meeting place for many of the cultivated plants of both tropical and temperate regions. The coastal districts of Queensland and northern New South Wales form one of these areas, and there are others on the eastern shores of Africa, America and Asia.

The author of this book is Professor of Botany in the University of Queensland, but lest this knowledge should discourage the ordinary gardener, let it be said at once that Professor Herbert is clearly also a practical gardener and has approached his subject from this and no other point of view. The result is a manual, partly composed of useful suggestions and partly encyclopaedic without being a mere catalogue of species, and it should, therefore, be of much assistance to the amateur, but of comparatively little value to the specialist or the advanced student of sub-tropical horticulture.

The book opens with three general chapters on preparation, planting and maintenance, and weeds, pests and diseases in which the use of proved modern methods and materials are not neglected. Six chapters follow devoted to short descriptions, with notes on special characters, propagation, etc., of annual and herbaceous plants, bulbs and allied plants, shrubs and hedge plants, climbers, trees, and fruits. The arrangement here is by scientific names in alphabetic order, but common names are also listed with the appropriate cross references. The remaining seven chapters on the vegetable garden, the bush-house, orchids, water plants, succulents, lawns, and plants suggested for a new garden also contain plant descriptions, and in addition provide information on the particular cultural needs of each group of plants. The term "bush-house" may need a word of explanation. It is applied to a shaded house or shed, which in some respects takes the place of the greenhouse of temperate countries. In it are grown, in the soil or in pots or baskets, the various shade-loving ferns, club mosses and foliage plants that are a common feature of household decoration in warm countries. There will doubtless be some gardening enthusiasts who disagree, here or there, with the author's opinions or with his treatment of a subject. For example, the bougainvillea enthusiast may consider that one-third of a page can scarcely do justice to so colourful a group of plants, and that in any case the white variety should at least receive a mention (despite its incredibly dreary appearance when the flower bracts wither). Again, the purist may prefer to find arum lilies under *Zantedeschia*

rather than under the older and more melodious name of *Richardia*. But all will surely unite in expressing gratitude to Professor Herbert for cutting every vestige of the poetic cackle that is apt to mar many otherwise useful books on gardening. His approach throughout is direct, simple and practical. Who, for instance, in describing the avocado could improve for brevity and clarity on: "The taste for avocado is usually an acquired one, but is worth acquiring"? The shortness of the glossary of horticultural and botanical terms indicates the simplicity of the style used.

It remains to mention that the book contains an adequate subject index and a number of good photographs, some showing most striking and unusual plants. In the unlikely event of the reviewer being transferred to a sub-tropical region he would, being an amateur gardener, be glad to take this book with him. G.K.A.

3636. HILKENBÄUMER, F.

Obstbau. Grundlagen, Anbau und Betrieb.
(Fruit growing.)

P. Parey, Berlin and Hamburg, 3rd edition, 1953, $8 \times 6\frac{1}{2}$ in., pp. 355, bibl. pp. 10, illus., DM 28.

The 3rd edition of Hilkenbäumer's book is reset in slightly smaller type. [For the 2nd edition see *H.A.*, 19: 1646.] This has given the author a chance of regrouping and rewriting, of which he has availed himself. As a result the style is now more concise in many places and the information is presented more neatly. Concurrently the number of photographs has been greatly reduced, and, instead, clear and useful schematic drawings have been incorporated to illustrate the author's point more clearly, especially with regard to pruning. In the chapters on physiology, management and others a more fundamental approach has been sought. In general the book has been brought up to date; thus a chapter (4 pp.) has been included on the use of growth substances, the treatment of plant protection has been modernized both as regards chemicals and equipment, and some details are given on frost protection by irrigation. Only a brief note is given on the use of fans for that purpose, as in their present form they are still considered uneconomical. One suggestion is new to the reviewer, namely that for preventing cold air stagnating near the ground by driving a flock of sheep through the orchard during the night. The bibliography has been considerably enlarged. Authors' names are given at the end of each chapter and the full reference appears in the comprehensive bibliography at the end of the book. To those who read German this new edition can be strongly recommended. D.A.

3637. HILLS, L. D.

Russian comfrey.

Faber & Faber, Lond., 1953, 9×6 in., pp. 167, bibl. 56, illus., 15s.

Symphytum peregrinum and other *Symphytum* spp., their history, cultivation and possibilities in connexion with composting, and as fodder. An agricultural crop of interest to the gardener.

3638. HYAMS, E.

Strawberry cultivation.

Faber & Faber, Lond., 1953, $9 \times 5\frac{1}{2}$ in., pp. 162, illus., 18s.

Interest in strawberry growing is bound to be roused by this challenging book, especially amongst gardeners.

It remains to be seen whether or not commercial growers will be influenced to the same extent by the glowing accounts of the cropping powers and quality of the unusual varieties that are recommended; in any case nurserymen are likely to be worried considerably by requests for varieties that they do not stock and of which virus-tested clones are not available.

The main part of the book deals with the production of strawberries over nine months of the year and chapters are devoted to the different parts of this period. There are also chapters on the origins of the strawberry, on manuring, varieties, propagation, pests and diseases, and experimentation.

Mr. Hyams's style is that of an essayist rather than an instructor and, while this makes his book delightful to read, he is not always accurate, simple advice being sometimes wrapped around with political or social views, and some of his arguments based on unsound premises. More attention to proof-reading, or possibly more care in the preparation of the original script, could have avoided obvious errors such as *Aphelenchus* (p. 145) for *Aphelenchoïdes*, *Phytophthora* (p. 147) for *Phytophthora*, and *Doyenne des Comices* (p. 150) for *Doyenne du Comice*, to cite but a few. It is, moreover, confusing to find the archaic name *Tylenchus devastatrix* (p. 145) used for stem and bulb eelworm instead of *Ditylenchus dipsaci*. The general index is scarcely adequate and does not always direct to the correct page.

The book is well illustrated with photographs and line drawings, and the general production is excellent.

H.B.S.M.

3639. IRVINE, F. R.

A textbook of West African agriculture, soils and crops.

Oxford University Press, Lond., 2nd edition, 1953, $7\frac{1}{2} \times 5$ in., pp. 367, bibl. 41, illus., 14s.

A manual which will put at the disposal of the West African agricultural student knowledge of modern developments in his particular field still remains to be written. Despite its addendum, the present edition of Dr. Irvine's book sadly fails in modernity and up-to-date advice.

D.H.M.

3640. LAVALRÉE, A.

Flore générale de Belgique. Spermatophytes.

Vol. 1, fasc. 2. (A general flora of Belgium.

Spermatophytes. Vol. 1, No. 2.)

Minist. Agric., Jardin bot. État, Brux., 1953, $10 \times 6\frac{1}{2}$ in., pp. 171-349, illus.

This second part of the flora of Belgian Spermatophytes covers the Angiosperm families Polygonaceae, Chenopodiaceae, Amaranthaceae, Aizoaceae and Portulacaceae. It is arranged on the same lines as Part 1 [see *H.A.*, 22: 3185].

3641. MALLEKOTE, L.

Zaadeelt. (Algemeen gedeelte.) (Seed production. General.)

Zaadeelt. (Bijzonder gedeelte.) De teelt van het voortkwekingsmateriaal der groentegewassen en kruiden. (Seed production. Particular crops.)

Particular crops. The production of propagating material of vegetables and herbs.)

J. Muusses, Purmerend, 1949, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 187, illus., fl. 4, and 1952, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 224, bibl. 16, illus., fl. 4.75.

Seed production is a subject on which there are few good books of reference available. This Dutch work, therefore, may find a wider public than the seed growers and horticultural students of Holland for which it is primarily intended. The first volume, published in 1949, gives a survey of the industry in Holland, its development, importance and areas of production, and then deals with the general principles of seed production. Information is given on growing, harvesting, storage, cleaning, testing, control regulations and selection. In the second volume, published in 1952, the individual crops are dealt with separately. Rather surprisingly, place is also given to the propagation of several crops that are not normally grown from seed, such as rhubarb, strawberries and shallots, on the grounds that these plants often form part of the seedsman's stock. The author, however, has drawn the line, probably wisely, at seed potatoes, a subject that has been dealt with adequately elsewhere. Of special interest is the section on herbs in which notes are given on the propagation of some 40 species. Apart from the rather chatty historical notes with which many of the crops are introduced, the information is soundly practical and includes not only cultural details but advice on the control of pests and diseases and annotated lists of varieties.

P.R.-D.

3642. MORTON, J. F., AND LEDIN, R. B.

*400 plants of South Florida.*Text House (Florida) Inc., Coral Gables, Florida, 1952, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 134, illus., \$3.50.

This well-produced volume in the Florida Nature Series contains good, brief, non-technical descriptions of some 400 exotic and indigenous trees, shrubs, climbers and herbs of South Florida. The botanical and common names of each are given and in some cases notes on uses. 28 species are the subject of full-page drawings in sepia. The illustrations, which are good likenesses, are artistic rather than functional and there is no indication of their scale. The use of solid colour can suggest a non-existent, strong contrast in colour (as between the upper and lower surfaces of the leaves of *Callistemon* and *Oncoba*), and is not so flexible as the more conventional methods (it has not been possible, for example, to suggest the characteristic rough texture of the leaves of *Petra*). J.D.

3643. MORTON, R. J.

*Perpetual flowering carnations.*Collingridge, Lond., 1953, 9×6 in., pp. 79, illus., 10s. 6d.

This is a small book dealing with the cultivation of perpetual flowering carnations under glass. It will be of value to amateurs who intend to grow these plants as a hobby and it contains many useful hints which may be of help to the commercial grower.

The early chapters give practical details about temperatures, ventilation, heating and shading. Mr. Morton does not mention, however, that constant attention is needed for adequate maintenance of heated glass and some amateurs, on reading this book, may not appreciate that the care of heated glasshouses is a full-time occupation. Clear instructions are given on propagation, the treatment of the rooted cuttings and the care of the mature plant, but the amateur grower would find the varying statements concerning the necessary tempera-

tures rather confusing. Other chapters outline operations such as staking, watering and feeding, and the final chapter is devoted to descriptions of insect and fungus damage and the usual methods of control. A good deal of common sense information, often lacking in accounts of cultivation, is included in this first portion of the book.

Mr. Morton then goes on to discuss commercial methods and soilless culture. This second half of the book is interesting, but I do not consider that the subjects are dealt with in sufficient detail to enable a reader to embark on either method without further information. A descriptive list of varieties is included as well as a chapter on raising carnations from seed. The book is well indexed and contains a number of clear photographs of varieties and operations. For those who already have a knowledge of greenhouse management it will furnish much useful information. M.P.

3644. PAKISTAN MINISTRY OF FOOD AND AGRICULTURE.

Crop wealth of Pakistan.

Co-operation and Marketing Adviser, Govt of Pakistan, Karachi, 1952, pp. 289, Rs. 3.

Useful details are given of areas devoted to particular crops and yields in Pakistan. The crops of interest to our readers, pp. 107-59, are sugar cane, palmyra gur [from juice of *Borassus flabellifer*], tobacco, tea, betelnut [*Areca catechu*], pan [*Piper betle*], chillies, coconut, onion and garlic, and ginger.

3645. PEARCE, S. C.

Field experimentation with fruit trees and other perennial plants.

Tech. Commun. Bur. Hort. Plant. Crops East Malling 23, 1953, pp. 131, bibl. 194, 10s. or \$1.40.*

Since T. N. Hoblyn's "Field experiments in horticulture" issued by this Bureau in 1931 as *T.C. 2*, the research worker has had no manual to consult on the layout of perennial crop trials. In this new account, based primarily on personal experience at East Malling, the author also gives serious consideration to all important research articles published on the subject in different parts of the world since 1931. It is hoped that the present work will thus prove equally valuable to the investigator and to the student who is preparing to become one.

D.A.

3646. SEARLE, S. A.

*Plant environment and the grower.*C. F. Cassella, Lond., 1952, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 50, bibl. 48, illus., 5s.

"The object of the booklet is to show the vitally important part that environment plays in horticultural crop production, and how the knowledge and control of plant environment can lead to substantial improvements, not only in output, but in net commercial yields." Soil and air temperature, humidity, air movement, sunshine and light, transpiration, and soil moisture are discussed. Methods of measuring these factors and details of the instruments used are given. The soil moisture tensiometer and its use, and the trickle method of greenhouse soil irrigation are described in detail.

* Obtainable from C.A.B., Farnham House, Farnham Royal, Bucks., England.

3647. STANILAND, L. N.

*The principles of line illustration.*Burke, Lond., 1953, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 212, illus., 25s.

A comparatively crude drawing by an author is often far more effective than the polished production of the hack, but few writers give any evidence that they realize this and too often, unnecessarily, forsake line drawing altogether in favour of photography, so expensive and so often disappointing. Mr. Staniland is out to help those of us who consider ourselves quite hopeless at drawing. He considers that photographs and wash drawings should be used only with the greatest economy, whereas line illustrations should be liberally employed; they save space by replacing words and can be placed conveniently alongside the relative text. Biology students are urged to form the habit of making pen and black ink drawings with their notes, the close observation necessary serving to impress important characters on the mind. Scientists have no need to be artists and can, with profit, employ any aid which saves time or promotes accuracy. Half the book is devoted unblushingly to aids to accurate drawing, including full descriptions of home-made tracing apparatus for objects of all kinds, flat or round, from a fasciated Sweet William to a soil profile. Thus, tracing is a great help to the indifferent draughtsman, yet does not prevent the skilful from adding individuality. As an aid to perspective, the glass tracing method described was known to have been used by Holbein and other masters. There is, however, much more in this book than a list of tricks for the beginner, and it is doubtful whether any illustrator could fail to profit from it. The draughtsman is given a clear explanation of the basic requirements of reproduction and the means of fulfilling them. Line drawing, shading, wet- and dry-brush drawing, splatter work, scraper board technique, the use of mechanical tones, and many other techniques are clearly explained. Enlargement and reduction, lettering, formation of charts and lantern slides, even the use of serial drawings to illustrate biological processes, are adequately described. Taking his own advice, Mr. Staniland has eschewed photographs and given us 166 drawings, many of real beauty in spite, or possibly because, of the free use of "aids to accuracy". From now on, no one dare claim complete inability to draw. Readers may care to correct one date. The last item on page 99 should be 1946, not 1936. R.J.G.

3648. STEFFEN, A.

*Unsere Lilien im Garten. (Our garden lilies.)*Paul Parey, Berlin and Hamburg, 2nd edition, 1953, $8\frac{1}{2} \times 6$ in., pp. 120, bibl. 20, illus., DM 6.60.

This new edition was prepared in the author's 82nd year, at Erfurt, the centre of the German seed industry, where Dr. Steffen turned breeder after his retirement from a distinguished career as Director of the State Horticultural Institute at Dresden-Pillnitz. The first edition appeared 24 years ago in 1929 and was exhausted soon after publication. Lilies do not thrive naturally in the continental climate of Germany's drier areas, and up to 1914 the country depended almost entirely on foreign imports. Later it required all the enthusiasm of men like Steffen to raise lilies from seed locally and

gradually make Germany more or less self-supporting. It is therefore not surprising that not one of the publications cited in the bibliography was written in the German language. The British, Dutch, or American reader—not to mention the Japanese—cannot expect to find much new information in this monograph, but it is pleasant to read, being written with that kind of authority which derives from a life-long devotion to a subject. The author deals with lily production in all its aspects, breeding and taxonomy, and finally gives well illustrated descriptions of many species, which make up more than one half of the book. An annotated list of eminent lily breeders and lovers is a feature that will be generally welcomed. V.H.G.

3649. TUKEY, H. B., AND BARRETT, M. S.

Combined Index to Proceedings of the American Society for Horticultural Science, Vols. 1-58 (1903-1951), W. F. Humphrey Press, Geneva, N.Y., 1952, 9×6 in., pp. 311, price \$4.

To index 58 such volumes might well have daunted a lesser man than the present chief of the Horticultural Department of Michigan, himself a former president of the Society and one of its most stalwart supporters. But Dr. Tukey is far from being daunted. He has credited his fellow members with common sense and has considered them first and foremost as horticulturists and not as entomologists, virologists, etc. Instead of compiling a book so heavy as to be dragged only with difficulty from its permanent place on the library shelf he has presented us with a slim volume about half the size of the current volume of the proceedings and in it he gives the "open sesame" to that deep well of information provided by his fellow workers during the first 50 years of the twentieth century. Not only does he give against an author's name the full titles of his papers—with cross references from 2nd and subsequent authors—but he also most helpfully cites the main author's name against each particular subject entry and thus saves the user of the index a great deal of time. He offers, in fact, a combined subject and author index, which gives immediate access to the required subject, whether the enquirer likes to look for his facts under Apple or Auchter, E. C., Partridge, N. L. or Rootstocks.

He and his collaborator, M. S. Barrett, have earned the gratitude of every freshman in a school of horticulture, every professor emeritus rewriting his textbook and, not least important, every horticultural investigator in mid career.

D.A.

3650. VANDERWEYEN, R.

*Notions de culture de l'Elaeis au Congo belge. (The cultivation of Elaeis in the Belgian Congo.)*Direction de l'Agriculture, des Forêts, des Elevages et de la Colonisation, Brussels, 1952, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 292, bibl. 51, illus., 200 fr. b.

The author, who is chief of the oil palm division of the Institut National pour l'Étude Agronomique du Congo belge (I.N.E.A.C.), gives an account of the technique of oil palm cultivation in the Congo basin. After preliminary remarks on the Congo varieties of *Elaeis guineensis*, and on selection and seed production,

he gives a detailed description of the methods of establishment and maintenance of plantations. Subjects are choice and lay-out of plantation site, seed germination (either the germination box method in which the seed is mixed with damp charcoal dust in boxes which are sunk in fermenting vegetable matter, or the hot room method), pre-nurseries, nurseries (open beds or baskets), preparation of plantation site (burning of forest and non-burning), planting, maintenance of plantations not yet in production (cover cropping with *Pueraria* and retention of all woody regrowth), maintenance of plantations in production (cutting back weed growth round the trees, removal of some palm leaves and of epiphytes, cutting back of woody regrowth in interlines to prevent shading). Moureau and Buycx respectively contribute sections on fungal and other diseases and their control, and on insect and other pests and their control. Finally there are chapters on interplanting with food crops, coffee and cocoa, on manuring and fertilization, yields (13 tons per ha. at Yangambi from 7 to 20 years old) and harvesting, and improvement by breeding and cultural methods. There are 4 coloured plates of the fruits of *Elaeis* and the text is illustrated by photographs and diagrams. J.D.

3651. WRIGHT, D. M.

Dwarf fruit trees.

Faber & Faber, Lond., 1953, 8 x 5½ in., pp. 111, illus., 7s. 6d.

This is a book intended not only to instruct the amateur but to infect him with the author's enthusiasm for dwarf fruit trees. The novice will find in it many of the helpful details so often omitted. The author has an understandable dislike for large trees with their attendant difficulties of management for owners of small gardens. It is pleasing to note that he is familiar with the semi-dwarfing rootstock M.VII for garden bush apple trees, though it is all the more surprising that he should fail to mention its value for intensive tree culture. The cultivation of cordons and dwarf pyramids, the control of pests and diseases and how to deal with mineral deficiencies are well described.

The useful dictum that the amateur should plant four late varieties for every early one appears to have been ignored in the recommendations made, although varieties of valuable after-Christmas apples are readily available. The instructions for growing delayed open centre trees might be difficult to carry out with trees on M.IX. The book is unusually free from inaccuracies, the author being evidently better acquainted than most with research findings. It should appeal to anyone who wishes to grow tree fruits in his garden. J.H.W.

Annuals and reports.

3652. ALGÉRIE, GOUVERNEMENT GÉNÉRAL.

Rapport du Conseil de l'Expérimentation et des Recherches agronomiques pour 1951-52, 1952. (Report of the Council for Experimentation and Agronomic Research for 1951-52), Algiers, 1952, pp. 288.

Organic manure: vine shoot manure. *Mineral fertilizers*: citrus, date palm. *Irrigation*: date palm, formation of a plough pan. *Other studies*: chloride tolerance of medlar. *Vine*: variety collection, rootstock tolerance to lime, bench grafting of hybrid direct producers,

paraffin-waxing in bench grafting. *Fruit tree crops*: physiology—date palm, olive, fig; clonal selection—citrus and pecan; cultural techniques—olive, fig, date palm and citrus. *Flower crops*: carnation, gladiolus, tulip, narcissus, freesia, iris, arum and dahlia. *Market garden crops*: tomato. *Phytohormones*: root promoting, thinning, parthenocarpy, hastening fruit maturity, breaking dormancy, inducing dormancy, reducing the phytotoxic effect of insecticides, inducing germination, fungicidal, herbicidal, regulating maturation. *Plant parasitology*: herbicides, *Emoasca libyca* on vine. *Other studies*: parasitism of scales, accelerated fermentation of tobacco. [See separate abstracts.]

3653. ARGENTINA.

Progresos científicos alcanzados durante 1952 por la Dirección General de Investigaciones Agrícolas y sus dependencias técnicas. (Scientific progress made during 1952 by the Department of Agricultural Research and its branches.)

Idia, 1952, 5 (59/60): 1-92.

Crops of horticultural interest mentioned are apple, citrus, coffee, date palm, hops, kok saghyz, olive, pear, pimiento, plum, sugar cane, tobacco, vegetables and vine. [See separate abstracts on citrus, kok saghyz and tobacco.]

3654. BIOLOGISCHE BUNDESANSTALT BRAUNSCHWEIG.

Jahresbericht der Biologischen Bundesanstalt für Land- und Forstwirtschaft in Braunschweig, 1951. (Annual Report of the Biological Federal Institute for Agriculture and Forestry, Brunswick, 1951), 1952, pp. 100, illus.

The following research projects of horticultural interest were among those under way at the various institutes of the organization, situated throughout western Germany: *Physiological botany*: Control of asparagus rust. *Virus research*: Biology of green peach aphid; distribution and overwintering of pea virus 1; vectors of legume viruses. *Bacteriology and serology*: The effect of 2,4-D on soil microflora; a new method of infecting tomatoes with *Bacterium michiganense*. *Applied chemistry*: Chemical virus diagnostics. *Grain, oilseed- and vegetable-cultivation*: Pest and disease control on vegetables and flowers. *Fruit growing*: The effect of BHC in soil on cultivated plants; the influence of E605 f and Nirit on the respiration of apple seedlings; comparison of spray and mist applications; pests and diseases of fruit trees; trials of spray materials and implements. *Viticulture*: Relationship between weather and grape vine pests; biology and control of downy mildew; trials of new chemicals; deficiency fertilizer trials; residual action of E605 on grapes. [See also separate abstracts in the relevant sections.]

3655. BRITISH COUNCIL.

Scientific Research in British Universities 1951-52.

H.M. Stationery Office, Lond., 1952, reprinted 1953, pp. 485, 8s. 6d.

The work of each university or college is divided according to subject, and under each subject heading are listed the names of the research workers and a broad description of the nature of their research. An author

index is also provided to enable the reader to obtain information on the work being carried out by any particular research worker. As is usual in such publications, the problem of what to insert and what to omit has not been entirely solved.

3656. CANADA.

Annual Report Fruit and Vegetable Products Research Committee, Department of Agriculture, 1951, pp. unnumbered [received 1953].

Brief reports are presented from various research centres in Canada on storage (pre-storage factors, harvesting, grading and packaging, storage environment) and processed foods. [See also separate abstracts.]

3657. COLONIAL DEVELOPMENT CORPORATION.

Report and Accounts, Colonial Development Corporation, for 1952, 1953, pp. 62, H.M. Stationery Office, London, 3s. 6d.

Of the current 56 projects reviewed, 18 are agricultural. Those of horticultural interest are vegetable growing in the Bahamas; ramie in British Honduras; citrus and banana in Dominica; citrus processing and storage in Jamaica; oil palm and cacao in Malaya; abaca in N. Borneo; ramie in Kenya; wattle in Tanganyika; tobacco and tung in Nyasaland; tobacco and market garden crops in Gambia.

3658. COMMISSIE VOOR HYDROLOGISCH ONDERZOEK, T.N.O.

Verslagen technische bijeenkomsten 1-6. (Reports of the technical meetings 1-6.) [English and French summaries.] [Publ.] *Ned. Centr. Org. voor toegep. natuurwetensch. Onderz.*, 1952, pp. 330, bibls., illus.

The six technical meetings of the Committee for Hydrological Research, T.N.O., deal with: Investigations into the water balance of the Rottegatspolder, The water supply for crops, Observations on soil water levels, Lysimeter investigations in the Netherlands, and The problem of salinity in soil and surface water in the Netherlands. Many of the papers presented are concerned with methods of investigation or are of agricultural interest. Those dealing specifically with horticultural problems have been abstracted separately.

3659. CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS [C.S.I.C.].

Memoria del Patronato Alonso de Herrera de Biología Vegetal 1950. (Report of the Alonso de Herrera Foundation of Plant Biology for 1950), Madrid, 1951, pp. 48.

Among the reports from the various institutes and research stations are the following. *Instituto "Jose Celestino Mutis" de Farmacognosia*: drug plants. *Instituto de Edafología y Fisiología Vegetal*: growth substances. *Misión Biológica de Galicia*: acclimatization of *Aleurites* spp. *Estación Experimental de Aula Dei*: selection of fruit varieties and rootstocks, grafting techniques, seed treatment of fruit species to improve germination. *Instituto de Aclimatación de Almería*: extraction of colchicine from *Androcymbium gramineum*.

3660. CORNELL.

65th Annual Report Cornell University Agricultural Experiment Station for the year 1951-52, 1952, pp. 117.

The research projects listed (pp. 63 onwards) include: *Agricultural economics*: Economic problems on fruit farms; labour for spraying apples and pruning fruit trees. *Agricultural engineering*: Mechanical equipment for pest, disease and weed control. *Botany*: Study of economic plants; urea application to apples; rhubarb; orchards; iris; induced tetraploidy in cantaloupes. *Entomology*: Red spider mite on lima beans; pests of in- and outdoor flower crops; pests of nursery crops and ornamentals; insects attacking cucumbers; compatibility demonstration on apples; insecticidal studies. *Floriculture and ornamental horticulture*: "Timing" carnations to bloom at a specific date; bud initiation in orchids; day-length studies with violets and chrysanthemums; effect of synthetic soil-aggregating agents on greenhouse soils; flower storage; various nursery investigations; breeding of ornamentals. *Plant Breeding*: Vegetable improvement; cytogenetic studies on *Nicotiana*. *Plant pathology*: Control of vegetable diseases; brown rot of stone fruit; diseases of roses; diseases of bulbous crops; bacterial soft rots of vegetables, fruits and ornamental plants; crown rot of rhubarb; x-disease of stone fruits; ringspot viruses affecting vegetables; cucumber mosaic virus in peppers and celery. *Pomology*: Fluctuation in the cold resistance of peach flower buds; cold hardiness in strawberry plants; fruit drop; storage studies. *Vegetable crops*: Soil reaction for vegetable crops; variety trials; weed control; improvement of cucumbers and melons.

3661. C.P.V. EXPERIMENT STATION, INDONESIA.

Jaarverslag van het Proefstation der C.P.V. over 1951. (Annual report of the C.P.V. Experiment Station, Indonesia, for 1951), 1952, pp. 120 [received 1953].

Agricultural Department of W. Java and S. and W. Sumatra: breeding and selection of hevea; manurial trials with hevea, tea, cinchona and cacao; rootstock, tapping and planting trials with hevea; topping cinchona; epiphyte control on oil palm; mechanization of land clearance and lalang control. *Central Chemical and Technical Department*: investigations on bacterial infection of latex, rubber quality, and tea manufacture. *Central Botanical Department*: physiological studies on rubber, tea and cacao; selection of coffee, tea, cinchona and cacao; pest and disease control studies on rubber, tea and cacao. *Agricultural Department of C. and E. Java*: hevea breeding and testing; coffee diseases; coffee clonal and seedling trials; tobacco breeding and pest control.

3662. DANSK GARTNERFORENING (DANVIG, A. M., AND PEDERSEN, K.).

Årbog for Gartneri 1952. (Horticultural year-book 1952.) S. L. Møllers Bogtrykkeri, Copenhagen, 1953, pp. 258, Kr. 3.

As usual, the first part of the Yearbook, pp. 7-126, contains much information on Danish horticulture, including research, training, associations, journals and production figures. The results of small-scale trials are reported in many separate papers, abstracts of the more important of which will be found in the appropriate sections of this number of *H.A.* A horticultural colour chart with code numbers, based on the British Horticultural Colour Chart, is included.

3663. DEPARTMENT OF AGRICULTURE FOR SCOTLAND.

Agriculture in Scotland, being Report of the Department of Agriculture for Scotland for 1952, 1953, pp. 96, illus., 3s. 6d.

The area under horticultural crops in 1952 is given as small fruits 9,617 acres, orchard fruits 1,196 acres, tomatoes and vegetables (other than potatoes) 10,057 acres. Estimated production and values for 1952/53 are: small fruits (other than raspberries) 4,890 tons, value in £'000 655, raspberries 12,940 tons, value 1,434, orchard fruits 3,250 tons, value 157, tomatoes 7,100 tons, value 972, vegetables other than potatoes value 1,822.

3664. EAST MALLING.

Annual Report of East Malling Research Station 1952, 1953, A36, pp. 190, 12s. 6d. and U.S.A. \$2.00.

As formerly the report consists of 4 parts: I. Notes on the experimental farm. II. A general review of research work completed and in progress in each of the sections, with lists of papers published during the year. III. Research reports and reviews, consisting of a series of separate papers. IV. Bulletins for fruit growers. [See separate abstracts of the papers in III and IV.]

3665. EUROPEAN PLANT PROTECTION ORGANIZATION.

Report of the Mediterranean Plant Protection Conference, Sicily, October 1952.

[Publ.] *Eur. Plant Prot. Org.*, 1952, pp. 23.

The European Plant Protection Organization held a Mediterranean plant protection conference in October, 1952. The main subject was the Mediterranean fruit fly (*Ceratitis capitata*), but consideration was also given to measures for keeping out 9 dangerous pests and diseases not yet observed in the Mediterranean basin, and to steps to prevent the introduction of phylloxera on vine cuttings imported into phylloxera-free countries. *Mediterranean fruit fly*. The conference considered that each Government should develop its own experimental and research organizations and maintain its own information centre and that EPPO should co-ordinate research and control, and issue a summary of all recent investigations. A summary is given of papers on *Ceratitis* read at the conference. *Dangerous pests and diseases not yet observed in the Mediterranean area*. The 9 dealt with are citrus black fly (*Aleurocanthus woglumi*), Mexican fruit fly (*Anastrepha ludens*), oriental fruit fly (*Dacus dorsalis*), melon fly (*Dacus cucurbitae*), citrus quick decline, citrus bacteriosis or canker (*Xanthomonas citri*), pink disease (*Corticium salmonicolor*) attacking citrus among other crops, Pierce's disease of the vine (*Lucerne dwarf*) and citrus black spot (*Phoma citricarpa*). Notes and recommendations are given. *Phylloxera*. It was considered there is no risk of introducing phylloxera with ordinary (not rooted) cuttings provided (1) cuttings are of the current year's growth, (2) cuttings are free from all traces of earth and are disinfected before and after transportation by dipping in heavy tar oil containing 0.2% parathion (15% active ingredient), (3) packing is clean and the packing material disinfected, and (4) importation is canalized through official channels. [See also 3465 for *C. capitata*.]

3666. CONGRÈS POMOLOGIQUE.

Congrès pomologique de France, 8 au 12 Octobre 1952, 83^{me} session, Alger. (Pomological Congress of France, 8-12 October, 1952, 83rd session, Algiers.)

Suppl. Pomol. franç., 1953, pp. 294, bibls., illus.

The following papers as well as those separately abstracted or noted are of interest: *Recherche de variétés fruitières améliorées: sélection parmi celles en culture, ou utilisation de nouveautés?* (Work on new fruit tree varieties: selection among those in cultivation or the breeding of new ones?); *Humus, structure du sol, perméabilité* (Humus, soil structure and permeability); *Insecticides et acaricides systémiques* (Systemic insecticides and acaricides); *La formation professionnelle pour les cultures fruitières en Algérie* (Professional staff organization for fruit crops in Algeria); *Irrigations dans les vergers* (Orchard irrigation).

3667. FRIESDORF (MÖHRING, H. K.).

XXIII. Tätigkeitsbericht 1951 der Gärtnerischen Versuchsanstalt zu Friesdorf/Bad Godesberg. (23rd Annual Report of the Horticultural Research Station of Friesdorf/Bad Godesberg for 1951), pp. 115.

Contains articles on: Apple and cyclamen manuring by foliage sprays; Flower variety trials; Currant and gooseberry trials; The control of pre-harvest drop in apple and pear; as well as others abstracted separately.

3668. HAWAII.

Report of the Hawaii Agricultural Experiment Station for the biennium ending June 30, 1952, Honolulu, 1953, pp. 74, illus.

Agricultural chemistry and soils: Processing of passion fruit, papaw, guava; storage changes in macadamia. *Agricultural engineering*: Underground distribution of irrigation water; mechanization of macadamia harvesting and husking. *Entomology*: Biological control of oriental fruit fly; melon fly control; cyclamen mite on watercress; macadamia nut borer. *Food and nutrition*: Composition and freezing of temperate and tropical fruits and vegetables. *Horticulture*: Cytology and genetics of orchids; chrysanthemum forcing; new hibiscus varieties; new macadamia varieties; papaw breeding; coffee yields. *Plant pathology*: Serious orchid diseases new to science; diseases of ornamentals, fruits, vegetables. *Plant physiology*: Sugar cane crop logging; litchi flowering; coffee leaf carbohydrates; macadamia nutrition; Koa haole seed germination; fumigation of export fruit and vegetables for control of fruit flies. *Vegetable crops*: Varietal trials with summer cauliflower, lettuce, tomato and carrot.

3669. INDIAN AGRICULTURAL RESEARCH INSTITUTE, NEW DELHI.

Scientific Reports of the Indian Agricultural Research Institute for the year ended 30th June 1950, 1952, pp. 101.

Botany: breeding of tomato, onion and rustica tobacco with a high nicotine content; *Sugar cane at Coimbatore*: breeding, control of flowering, etc. [see abstract 3596]. *Soil science and agricultural chemistry*. *Pathology*: sugar cane resistance to red rot, pigeon pea resistance to wilt; *Entomology*.

3670. INDIAN COUNCIL OF AGRICULTURAL RESEARCH.

Annual Report of the Indian Council of Agricultural Research for 1950-51, Swan Press, Delhi, 1953 [?], pp. 170.

Spices and condiments. Investigations on cloves in Travancore, cardamom, pepper, chilli and ginger in Madras, turmeric in Orissa, coriander in Madhya Bharat. *Pests and diseases*. Prevention and control schemes for chilli thrips (*Sethrothrips dorsalis*), aphids on cruciferous vegetables, brinjal beetle (*Epilachna* sp.), mango hopper and mango mealy bug; Katte virus disease of cardamom. *Fruits*. Rootstock, varietal, manurial, disease and pest control, propagation and cultural studies on citrus, banana, apple, plum, custard apple, grape vine, litchi, papaw and cashew.

3671. INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE.

Compte rendu des travaux effectués dans les Stations Agronomiques au cours de l'année 1951. (Annual Report on studies conducted at the [French] Agronomic Stations in 1951.)

Ann. agron. Sér. A, 1952, 3: 467-712.

In addition to the work done at the Agronomic Stations under the control of the National Institute of Agronomic Research, this report records the research conducted at the Versailles Plant Physiology Laboratory which is not under the direction of the Institute but works in close association with it. The report contains summaries of work already published and more detailed notes on unpublished experiments. [See also separate abstracts.]

3672. JAMAICA.

Department of Agriculture, Jamaica. Investigations 1950-51.

Bull. Dep. Agric. Jamaica 49, [1953?], pp. 153, 2s.

Economic entomology: Pests of sugar cane, citrus, coconut, coffee, cacao; host plants of *Heterodera marioni*; biological control (including *Plaesiuss javanus* on *Cosmopolites sordidus*). *Plant pathology*: Coconut, cacao, tomato. *Cultivated trees, shrubs and vines*: Banana: varietal trials, propagation studies, management trials; cacao; cashew; citrus: propagation studies and management trials; coconut; coffee; ginger; mango; oil palm; pineapple. *Vegetables*: Tomato fertilizer trials.

3673. KENYA.

Annual Report of Kenya Department of Agriculture for 1952, Part II, *Research and Specialist Services*, (Advance Copy), pp. 16. typescript.

Coffee: biological control of *Planococcus kenyae* and insecticidal control of its attendant ant; insecticidal control of *Antestia* and *Diarthrothrips*; field studies of serious infestations of *Habrochila placida* due to suppression of its capsid predator by DDT used against *Antestia*; effect of sprays on leaf fall; tractor-mounted rotary hoe tests; manurial and mulching trials. *Pyrethrum*: breeding methods; control of bud disease (*Ramularia bellunensis*); picking/stripping and fertilizer trials. *Sisal*: hybrid, spacing, spacing/cutting, grass/sisal rotational, mulching, and fertilizer trials; couch grass

(*Digitaria scalarium*) control. *Sugar cane*: variety collection; varietal, spacing/ridging, fertilizer trials and studies on herbicides in young cane. *Horticulture*: temperate fruits and vegetables at Molo, tropical and subtropical fruits at Matuga and substations, pineapples at Thika and on the coast; Cambridge Pine (448) and Cambridge 449 are strawberry varieties recommended for local planting. *Pathology*: Panama disease of banana (*Fusarium cubense*) was recorded in Kenya for the first time in 1952; it is distributed sporadically along the coastal belt and chiefly attacks sweet eating bananas.

3674. THE MACAULAY INSTITUTE FOR SOIL RESEARCH.

Annual Report of the Macaulay Institute for Soil Research for 1951-52, Craigiebuckler, Aberdeen, pp. 52, illus.

Plant physiology: Ni toxicity, determination of distribution of mineral nutrients in plants by the autoradiograph technique.

3675. MADAGASCAR, INSPECTION GÉNÉRALE DES SERVICES AGRONOMIQUES.

Recherche agronomique de Madagascar. (Agricultural research in Madagascar.)

C.R. Rech. agron. Madagascar, 1952, No. 1, pp. 104, illus.

This first annual report of the Madagascar Agronomic Research Service is a very well presented, well illustrated document. The service operates the following 7 main stations: (1) Lake Alaotra agronomic station (altitude 760 m., mean annual temperature 20.75° C., rainfall 1,126 mm. during 96 days in summer) for fundamental research; (2) Ankaizinana station (1,050 m.) near Bealanana for high-altitude crops including arabica coffee; (3) Antalaha station for vanilla research; (4) Ivoloina station near Tamatave for plants suitable for the east coast: coffee, pepper, vanilla, essential oil plants, citrus, etc.; (5) Mangoky station for domestic and industrial crops in dry regions; (6) Maravoay station near Majunga for rice and plants suitable for the western region; and (7) Tuléar station for crops, chiefly fruit trees, for dry regions. [See also separate abstracts.]

3676. MARAIS, J. S.

Farming problems in the winter-rainfall area.
Fmg S. Afr., 1952, 27: 625-9, 635.

This report of the Stellenbosch Elsenburg College of Agriculture, South Africa, for 1951/52 includes brief details of vegetable fertilizer trials, the application of micro-elements to vines, the control of snails damaging lupin green manure crops in vineyards, pest and disease control in vines and vegetables, and vegetable variety trials.

3677. MONTANA.

Some Accomplishments of Ten Years of Agricultural Research in Montana, being *50th-59th Annual Reports of the Montana Agricultural Experiment Station*, July 1, 1942-June 30, 1952, pp. 80.

Botany and Bacteriology: Virus diseases of cherries; bean diseases. *Horticulture*: Fertilizers for vegetable seedling transplants; improvement of crops, including tomatoes, onions, roses and chrysanthemums, by the application of skim milk to the soil.

3678. NAALDWIJK.

Jaarverslag en over 1951 en 1952 van het Proefstation voor de Groenten- en Fruitteelt onder Glas te Naaldwijk. (Annual Reports of the Research Station for Fruit and Vegetable Culture under Glass, Naaldwijk, 1951 and 1952), pp. 64 each.

Manurial experiments continued with grapes, peaches, tomatoes, strawberries, lettuces and cauliflowers. *Cultural experiments* continued with mushrooms, flowers, grapes, tomatoes and lettuces, and on the artificial illumination of tomatoes, cucumbers, lettuces and chrysanthemums. *Breeding and selection* of grapes, tomatoes, calceolarias, cinerarias and carrots. *Variety trials* of cauliflowers, lettuces, spinach, beans, chrysanthemums, melons and cucumbers. *Cool storage trials* with grapes. *Pest and disease control experiments*.

3679. NAUDE, T. J.

Entomological services and research.

Fmg S. Afr., 1952, 27: 616-21.

The ground covered in this summary of work done in 1951/52 by the Division of Entomology, South Africa, includes the biological control of prickly pear, insecticide registration and testing, pests of citrus and subtropical fruits, deciduous fruits, stored products, pineapples, tobacco and castor oil, and methods of controlling eelworms.

3680. NEVELING, C. H. (UNION OF SOUTH AFRICA, SECRETARY FOR AGRICULTURE).

Report of the Department of Agriculture for year ended 31 August, 1952.

Fmg S. Afr., 1952, 27: 521-47.

As in the past the report of the Secretary for Agriculture contains an account of administrative services, legislation and summaries of production and consumption of the main agricultural products. [His report is followed by Divisional Reports some of which are abstracted in this number.]

3681. NYASALAND PROTECTORATE.

Annual Report of the Department of Agriculture for the year 1951, Part II, 1953, 5s.

Tobacco. Fertilizer and strain trials. *Tea.* Nursery, cultural and fertilizer trials. *Tung.* Propagation, varietal, cultural and fertilizer trials; laboratory investigations; nutritional experiments. [See separate abstracts on tea and tung.]

3682. PURDUE UNIVERSITY.

Progress of Agricultural Research, being 64th Annual Report of the Director, Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1951, pp. 147, illus. [received 1953].

Horticultural crops: Commercial type tomato strains with 10 to 15 times the normal pro-vitamin A (β -carotene) content are available, though they are still of inferior flavour. Breeding disease-resistant tomatoes and apples. Variety trials with water- and muskmelons. *Herbicides and fungicides:* 2,4,5-T for control of woody species. [For work on brown-rot see abstract 2815.]

3683. PURDUE UNIVERSITY.

Progress of Agricultural Research, being 65th Annual Report of the Director, Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1952, pp. 167, illus.

Horticultural crops: tomato breeding; fertilization of muck soils; vegetable variety trials. *Herbicides and insecticides:* spraying tomatoes with concentrates; fungicides for apples; grape spray schedule; chemical weed control in mint; control of cabbage maggots, and pests of mint, strawberry, and fruit trees. *Basic science and agriculture:* use of C¹⁴ for the study of plant pigments; study of chemical composition of apple odour. [See also separate abstracts.]

3684. RUMBEKE-BEITEM (WESTVLAAMSE PROEF TUIN).

Verslag Westvlaamse Proeftuin 1951. (Report of the West Flanders Experimental Garden, Rumbek-Beitem, for 1951), pp. 31, illus. [received 1953].

Trials on plum rootstocks; apple tree forms, rootstocks, varieties, manuring and spraying; pear rootstocks, intermediates and varieties.

3685. SAUNDERS, A. R.

Agricultural research in Natal.

Fmg S. Afr., 1952, 27: 622-4, 635.

This 1951/52 report of the Natal Agricultural Research Institute contains brief references to an economic survey of sugar cane production costs, the appearance of citrus "greening" at Ukuilinga, and a carrot spacing trial.

3686. TUNISIE, SERVICE BOTANIQUE ET AGRONOMIQUE.

Rapport sur les travaux de recherche effectués en 1952. (Report on research work in Tunisia conducted in 1952), 1953, pp. 129.

Market-gardening crop laboratory. Tomato: selection, field trials, introductions. Tobacco: trials of introductions. *Agricultural entomology station.* *Ceratitis:* bait trials, chemical control of larvae. *Fruit growing laboratory.* Pomological collections; grafting pistachio; apricot breeding; grafting olive. *Botanical laboratory of Colonial School of Agriculture at Tunis.* Study of the wine and cultural qualities of vine varieties. [The 1950 and 1951 reports have also been received.]

3687. TYSER, H. F. (Editor).

The fruit annual 1952-1953.

British-Continental Trade Press Ltd., 222 Strand, London, 1953, 9 1/2 x 6 in., pp. 423.

Special articles in this year's useful reference volume deal with development in canning technique (5 pp.), fruit refrigeration progress (6 pp.), and consumer packages for fruits and vegetables (4 pp.).

3688. U.S. SECRETARY OF AGRICULTURE.

Report of the Secretary of Agriculture, 1951. U.S. Govt Printing Office, Washington, 1952, pp. 38, 20 cents.

A shorter than usual report on agricultural production, food consumption, land conservation, research, foreign trade, organization and other aspects of agriculture in the United States.

New periodicals.

3689. FACULTY OF AGRICULTURE, KAGOSHIMA UNIVERSITY, JAPAN.

Bulletin of the Faculty of Agriculture, Kagoshima University [Bull. Fac. Agric. Kagoshima Univ.], 1952, No. 1, pp. 138.

An editorial note states: The bulletin has been published as the sequel of "Bulletin of the Kagoshima Agricultural College, No. 15, 1949". It consists of research papers in Japanese with English summaries. The field covered is wide.

3690. INDIAN RUBBER BOARD.

Indian Rubber Board Bulletin [Indian Rubb. Bd Bull.], 1951, Vol. 1, No. 1, pp. 24.

The aim of this quarterly journal is the dissemination of technical information among Indian rubber growers. The stated intention is to depend for technical matter largely on Malayan and Ceylon publications but also to publish some original articles, as well as news, notes, announcements and Indian rubber statistics.

3691. NETHERLANDS SOCIETY FOR AGRICULTURAL SCIENCE. *Netherlands Journal of Agricultural Science*,

[Neth. J. agric. Sci.], Wageningen, February 1953, Vol. 1, No. 1, pp. 72, subscription fl.16 (approx. 30s. or \$4.25) per volume.

The Netherlands Society for Agricultural Science has hitherto published a monthly journal in Dutch, the *Landbouwkundig Tijdschrift*. In order that Dutch work of international rather than local interest may be more readily available to foreigners, it has been decided to publish this additional new journal in English. It will contain original articles by Dutch workers, working either in Holland or abroad, on agricultural investigations of general interest, or reviews of recent advances made in various branches of agricultural research in Holland. English abstracts will be given of publications and theses appearing in Holland. The journal has the same format as the *Landbouwkundig Tijdschrift* and will appear quarterly.

Noted.

3692.

a *Amateur Gardening Handbooks* issued by Collingridge, London, 1953, pp. 92 each, illus., 3s. 6d. each.
Snelling, E. Garden chrysanthemums.
Pearce, S. A. Flowering shrubs.
Huxley, A. J. Cacti and succulents.
Cocker, H. Annual flowers.

b BASUTOLAND.

Annual Report of the Basutoland Department of Agriculture 1952, 1953, pp. 40, illus.

c BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE.

Agricultural Statistics Reports, Years 1950 and 1951, 1951 and 1953, pp. 54 and 53 respectively.

d IRELAND. DEPARTMENT OF AGRICULTURE. *Twenty-first Annual Report of the Minister for Agriculture of the Republic of Ireland 1951-52*, Dublin, pp. 87, 7s.

e JAMAICA.

Annual Report of the Department of Agriculture Jamaica, 1951, 1952, pp. 24, 2s.

f "DE LANGE OSSEKAMPEN", WAGENINGEN. *Jaarverslag 1950, Centrale Bemestingsproefveld voor de Fruitteelt "De Lange Ossekampen"*, Wageningen. (Annual Report "De Lange Ossekampen" Central Manorial Trial Ground for Fruit Culture, Wageningen, for 1950), pp. 89, illus. [received 1953].

Manorial trials with apples and pears.

g MICHIGAN.

Sixty-fifth Annual Report of the Michigan Agricultural Experiment Station, July 1, 1951 to June 30, 1952, Lansing, 1952, pp. 301.

h MINISTÈRE DE L'AGRICULTURE, FRANCE.

Repertoire alphabétique en langue française du lexique trilingue, Repertoire . . . langue anglaise . . ., Repertoire . . . langue allemande du lexique trilingue. (French, English, German; English, German, French and German, English, French lexicons.)
Études 92, 95 and 101, du Service de la Documentation sur le Machinisme Agricole (SDMA), 63 bis, rue de Varenne, Paris 7e, [1953?], pp. 50, 55 and 57.
Useful aids to those who struggle with foreign languages.

i NORTHERN NUT GROWERS' ASSOCIATION INC.

Report of the 43rd Annual Meeting of the Northern Nut Growers' Association 1952, Rockport, Indiana, pp. 174. (See separate abstracts.)

j NYASALAND PROTECTORATE.

Annual Report of the Nyasaland Department of Agriculture for the year 1951, Part I, 1952, pp. 20+graphs, 2s. 6d.

k ROTHAMSTED (LAWES AGRICULTURAL TRUST).

Results of the field experiments 1951. [Publ.] Rothamsted exp. Stat., [1953?], pp. numerous, 5s.
An appendix to the Annual Report.

l SIERRA LEONE.

Annual Report of the Sierra Leone Department of Agriculture for the year 1950, 1952, pp. 24, 1s. 6d.

m STORY, R.

A botanical survey of the Keiskammahoek District.

Bot. Surv. Memoir S. Afr. Dep. Agric. Div. Bot. 27, 1952, pp. 184, bibl. 6 pp., illus.
A fine production, which is, however, of limited interest to horticulturists.

n ST. VINCENT.

Annual Report of the St. Vincent Agricultural Department, 1950, 1952, Kingstown, pp. 53.

NOTES ON BOOKS AND REPORTS

o UGANDA PROTECTORATE.

Annual Report of the Uganda Department of Agriculture, 1951, 1952, Entebbe, pp. 56, Shs. 2/25.

p WYE.

Report of the Department of Hop Research, Wye College, Kent, for 1952, 1953, pp. 70, 4s. See separate abstracts.